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A Record of the Progress of Pharmacy and the Allied Sciences

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THE AMERICAN
JOURNAL OF PHARMACY

VOL. 100 JUNE, 1928 No. 6

EDITORIAL

COMMENCEMENTS AND DEGREES

JUNE IS the month for marriage and graduation. A dryasdust journal must not discuss the former, which is the province of poets, novelists and dramatists, with not infrequent intervention of courts and lawyers.

No doubt many persons have wondered why the closing exercises of colleges are called "Commencements." To the majority of teachers they are welcome terminations of work. It is of some interest to inquire into the history of the word and determine its exact significance. The "commencement" is of the graduate, not of the college. The New English Dictionary, a monumental work, the compilers of which have endeavored to find the earliest occurrence of every English word, quote from a letter written in 1573, "This is mi year to commense master of art." (Spelling was largely by ear in those days.)

Unfortunately, the detailed history of the development of the ceremony is not available, but we cannot doubt that it has undergone evolution from irregular and local customs to the forms now exhibited. The fundamental principle was to make the degree a certificate of proficiency in some field of study, but it was not long before institutions of learning began to award recognition to persons not of the student-body and later it was found that other reasons than service to science or philosophy or to the cause of mankind in general might be thus rewarded. Honors began to be conferred for financial support directly or indirectly. "Aberdeen University," Dr. Samuel Johnson is reported to have said, "grew rich by degrees."

In American professional schools it was long a custom for some member of the faculty to deliver the "good bye" address to the grad-

uates. It was assumed in turn and was generally regarded as a bore. At the present day it is customary to invite some outsider. The greater colleges can generally secure the services of prominent persons; the smaller ones must be contented with the less distinguished.

In these days degrees are numerous. Bachelors, masters and doctors abound in the land. It seems likely that the master's degree was at one time higher than the doctorate, but the reverse is now mostly the case. Of the origin of collegiate degrees, the New English Dictionary gives an interesting quotation from Edward Gibbon's biography. Gibbon was a most industrious seeker for historical data:

> " . . . deep and slow, exhausting thought
> And having wisdom with each studious year."

He tells us that "The use of academical degrees is as old as the 13th century; is visibly borrowed from the mechanic corporations, in which an apprentice, after serving his term obtains a testimonial of skill and a license to practice his trade and mystery."

It is a little humiliating that our doctors, masters and bachelors must regard their honors as derived from "rude mechanicals," but there is a very striking example of a distinguished institution having an humble origin. This is the Royal College of Surgeons of England. In very early days, the practice of medicine, especially among the lowly, was the duty of the church During the reign of one of the Tudors, Parliament passed an act prohibiting a monk from doing a "bloody operation," and relegated to the barbers certain privileges, among which were cupping, leeching and bleeding. The barber was obliged to have a pole with alternate stripes of red and white and a bowl, the former indicating the arm wrapped with a bandage after opening the vein. For some time the "barber surgeons" to the Court were a distinct and important group, but later they were incorporated as "The Company of Barbers and Surgeons, Practising the Mystery of Surgery." It will be noticed that the barbers are mentioned first, but they have disappeared from the title of the institution that now controls admission to the practice of surgery in England. It is worth noting that English surgeons do not as a rule have the title of "doctor." They enter practice as "Mister." Many of them get special

titles, mostly "Sir." The distinguished promoter of antiseptic surgery was at first "Mister Lister," later he was Sir Joseph Lister and finally, Lord Lister.

The title "Professor" has also undergone much change. It has been stated that it only belongs to one who has the right to sign a diploma conferring a degree, but nowadays, in American professional schools the humblest instructor can hardly escape the title.

HENRY LEFFMANN.

THE REMINGTON HONOR MEDALIST
1928

Charles Herbert LaWall

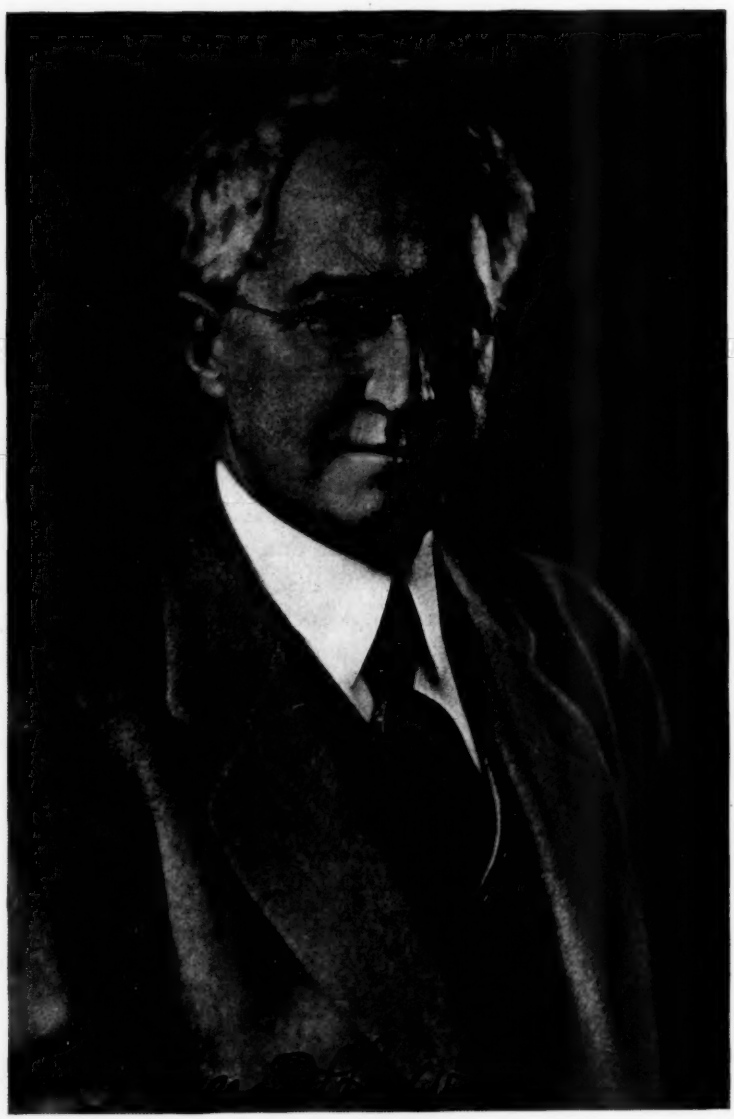
THE RECIPIENT of the Remington Honor Medal for distinguished achievements in the cause of Pharmacy during 1927 was, happily enough, one of Dean Joseph P. Remington's own pupils and proteges—and his successor as head of the Institution where Professor Remington had labored so long and so effectively.

That the Committee of Past Presidents of the New York Branch of the American Pharmaceutical Association, whose privilege it is to confer the award, judged wisely and well, is the opinion of all who are conversant with the splendid accomplishments and the high services which this recipient has performed for Pharmacy—not only during 1927—but ever since his association with the calling.

His widely read book "4000 Years of Pharmacy," published during 1927, has contributed more than any one factor to securing a high public estimate of the beneficent services of Pharmacy—not in the past—but currently and for posterity. The award was made at a dinner tendered by the New York Branch of the American Pharmaceutical Association, at the Hotel Pennsylvania, evening of Monday, May 14th. To the gathering had come, from all parts of the country, a host of friends and admirers of this renowned author, educator, pharmacist and chemist—whose work has serviceably diffused into every branch of pharmaceutical activities.

The Medal was presented by Senior Past President of the New York Branch of the A. Ph. A., Dr. Jacob Diner, Dean of Fordham University College of Pharmacy. Hugo H. Schaefer, President of

THE REMINGTON HONOR MEDALIST



Charles Herbert LaWall

the Branch, presided over the meeting; Dr. H. V. Arny spoke with his customary grace and spirit on "LaWall the Author," Professor E. Fullerton Cook lauded the medallist in response to a toast, "LaWall the Public Servant." Professor Ivor Griffith spoke on "LaWall the Educator," and Dr. Evander F. Kelly, of Baltimore dealt with Dr. LaWall's association activities. Dr. Wilhelm Wurtenburg spoke on behalf of the group of German pharmacists, who at the time were visiting New York, and were present as guests of the Branch. Professor LaWall feelingly responded to the many toasts and was tendered a rousing ovation by the splendidly representative group which had come to do him honor.

Previously his Philadelphia friends had paid him a similar tribute, when on his birthday, May 7th, the auditorium of the new building of the College had been filled to capacity to entertain him to dinner and to present the institution with a bronze bust of Dean LaWall, sculptured by Alexander Portnoff. Dr. Krusen, president of the College, was toastmaster. Prominent speakers were E. G. Eberle, editor of the *Journal* of the American Pharmaceutical Association; John H. Maurer, first assistant district attorney of Philadelphia; Prof. H. V. Arny, of the New York College of Pharmacy; Rev. Ernest Bawden, Dr. S. Solis-Cohen, Mrs. Bertha L. DeG. Peacock, president of the Alumni Association of the P. C. P. & S.; Prof. E. Fullerton Cook, who presented the bust and Mr. Joseph W. England, who, as chairman of the Board of Trustees, accepted the gift and announced its permanent placement in the Hall of the College.

Professor LaWall responded with his usual grace and reminded his listeners that Pharmacy indeed had an unyielding option on his services for he had been born over a drugstore—that his father was a pharmacist and that when it came to being accepted as a husband a woman pharmacist had exercised that choice.

When it came to writing a brief story of the Medallist's accomplishments, the number of them rather startled initiative and stultified ambition in that direction, but to our rescue came the Class book of the Graduating Class (1928) of the Philadelphia College of Pharmacy and Science. So uniquely has this class dedicated its book to the beloved Dean that we lift the entire story from that sincere source. Here it is:

1928

Pharmacopoeia Philadelphiae

CAROLUS HERBERT LAWALLUS

Charles Herbert LaWall

Off. Abbrev.: C. H. L. *Syn.: The Dean*

Official Definition: A gentleman and a scholar.

TESTS FOR IDENTITY:

A productive worker, infinitely patient with every undertaking and with an abiding faith in his fellow workers.

Somewhat impatient with those of less talent than himself and intolerant of shirkers.

Very friendly to a lucky few—yet beloved and respected by everybody.

Understandingly religious—a patriotic citizen, motivated by the highest kind of community and national ideals.

PHYSICAL AND MENTAL CONSTANTS:

Natively virile in mind and body, and constantly insuring this virility through mental and physical discipline.

Very quick and correct in judgment. Possessed of a keen sense of humor. Inspiringly optimistic.

Enthusiastic with the worthwhile and frigid to buncombe.

Definitely scientific and professional in ideals.

SPECIAL TASTES, GIFTS AND AVOCATIONS:

Highly appreciative of all art, choosing, without pose or effect, always the thing that is beautiful.

A voluminous, remembering reader, attuned to the finer elements of all music, though not specially expressive of it—in painting and sculpture—in written prose or poetry—his preferences are always happily balanced.

As a teacher and writer the wealth of his education and the breadth of his information are ever apparent.

A botanist and geologist—fond of and versed in the natural sciences, he finds a heap of joy in living close to nature.

DOMINATING PERSONAL CHARACTERISTICS:

Virility, unselfishness and an ability to constantly impress his sincerity and fitness for leadership, without any special effort.

HABITAT, HISTORY, ETC.

Charles Herbert LaWall was born in Allentown, Pa., May 7, 1871. He received the degree Ph. G. from the Philadelphia College of Pharmacy and Science in 1893 and the Ph. M. in 1905. The University of Pittsburgh conferred the honorary Phar. D. upon him in 1919, and Susquehanna University honored him with the Sc. D. degree in 1920. Under the tutelage of Professor Remington he was chosen instructor in Pharmacy at his Alma Mater from 1900 to 1905, associate professor from 1905 to 1918, later becoming Professor of Pharmacy and Dean of the Institution. From 1908 to 1924 he was also professor of organic chemistry at the Wagner Institute of Science, Philadelphia. Since 1904 he has been chemist to the Pennsylvania Food and Dairy Commission and to the Pennsylvania Board of Pharmacy. He was secretary of the Revision Committee of the U. S. Pharmacopœia from 1910 to 1918, chairman from 1918 to 1920, and secretary again since 1920.

At the death of Professor Remington in 1918, he succeeded that able leader, in the Chair of Pharmacy and as Dean of the Institution. He succeeded him in the revision work of the Pharmacopœia. The chairmanship of the Revision Committee (9th Revision), naturally devolved upon him and the consummate skill wherewith he picked up the threads dropped by his predecessor, and continued without delay the plan of weaving a great work—stands as high tribute to his fine sense of responsibility—and to his versatility.

Under his able leadership the College has risen to new heights —and no one questions the fact that the New Institution in its splendid quarters in West Philadelphia owes its existence in great measure to the initiative, enterprise and inspiration of Dean LaWall.

His literary productions are diversified. Professors LaWall and Cook, with collaborators are responsible for the New Remington's Practice of Pharmacy—a book that has become a scientific classic.

The U. S. Dispensatory (Wood and LaWall)) exhibits his handiwork. But the book, which, more than any other, establishes him as a real writer is his popular "Four Thousand Years of Pharmacy."

It has been accepted in authoritative scientific circles as a responsible historical work.

One reads on the dedication page of that book an unusual bit of prose:

> This book is Dedicated
>
> to
>
> The One who has helped me in my work and who has shared in my play, who does not object when I bring old or new books home, and who endures in silence the chaotic appearance of our home during periods when manuscript is in preparation or proof is being read; whose stimulating companionship has made all my work possible
>
> My Wife

It is highly typical of the author—and an indication of the acquisition made when in 1907 he married Millicent Renshaw, a graduate of the class of 1904 of the College.

Never was there a happier union of congenial souls.

It would be impossible to do justice to the subject of this brief sketch—lacking the space of a score of pages—for his attainments are innumerable.

The regard with which he is held by American Pharmacy is exemplified by the most recent honor which has come to him—namely the Remington Honor Medal—which is awarded annually to the individual who has in the previous year accomplished the most signal service for his profession.

The Class of 1928 is proud of its accomplishments—proud of the New Institution—and prouder than all of its Dean—Charles Herbert LaWall."

And not only the Class of 1928—but all Pharmacy can well be proud of the 1928 Remington Honor Medallist.

ORIGINAL ARTICLES

PHARMACEUTICAL MANUFACTURING

An Address Delivered Before the Junior and Senior Class of the New Jersey College of Pharmacy

By F. W. Nitardy, Brooklyn, N. Y.

PHARMACEUTICAL manufacturing is a specialized field of pharmacy. We know that originally the druggist prepared in his own shop the tinctures, pills and other products that he needed. Man originally probably was his own grower and gatherer of drugs, pharmacist and physician. In time there came specialization, the development of the medicine man, a sort of combination physician and pharmacist—later pharmacy became a separate profession. Today there are many branches representing specialized fields of endeavor, in both the commercial and professional side of the calling. Pharmacy is indeed a very broad art and science and may include everything from drug farming, manufacturing, wholesaling and retailing to teaching and research in the several branches of science involved in developing, creating and dispensing the products needed for the prevention, alleviation and cure of the ills which affect man, beast and plants.

Thus manufacturing as a separate branch of pharmacy, developed, because of the same economic factors which fostered specialization in every other human activity.

There are, however, certain conditions which have made this specialization in the pharmaceutical field a necessity to a degree which the usual economic factors as such would not have brought about so quickly. These factors are the Food and Drugs Act and the standardization of products by assay, both chemical and biological. The U. S. P. VI published in 1882 contained two assay processes. The next decennial revision contained assay processes covering five products. The U. S. P. X and N. F. V at present official contain three hundred forty-five chemical and twenty biological assays.

You undoubtedly, in your work at the College, have assayed products and know how much time and skill are required and I believe will readily concede that it would be neither profitable nor feasible for the retail pharmacist of today to make and standardize his own tinctures, fluidextracts, etc. The cost involved would be

greater than the price at which finished, properly assayed preparations can be purchased. Is it any wonder that the retailer finds it more profitable to devote his time to the active merchandising of the products in his store? He realizes, also, that aside from being non-profitable, it is difficult to produce products of the desired uniformity and quality when made on a small scale.

Specialization has developed because it brings advantages for all concerned. Advantages of large scale manufacturing may be summarized as:

(1) Buying Power, with resulting lower cost of all materials.
(2) Better opportunity for control and selection of raw materials.
(3) Opportunity for research on the development of better processes and products as well as improving their stability.
(4) Opportunity to use power and machines.
(5) Greater uniformity of products, their proper control and standardization.
(6) Opportunity for research on new products.

Let us examine these more closely.

Buying Power. The advantage of buying in quantity is so well understood that no comment is needed. Drugs, chemicals, solvents, containers, in fact every material required can be purchased to much greater advantage. Such purchases at the same time reduce freight and handling charges and often eliminate container costs entirely, through the use of tank cars.

Control and Selection of Raw Materials. In every field one finds great variation in quality or grade of material available. When raw materials are purchased in very small quantities, it is difficult to spend the time required for careful selection. Manufacturers who need them in large quantities have an opportunity to go to a great deal of trouble in selecting the highest grade available. In the case of crude drugs, such selection usually includes the chemical or biological assay of samples representing various lots so that the selection is not made entirely on physical condition and appearance. At the Squibb Laboratories, for instance, no raw material is used without complete test and examination. It is common practice in the purchase of such a drug as, for instance, Digitalis to make biological examination of the various lots available on the market and base the selection of the drug on these examinations.

Research on the Development of Better Processes and Products and the Preservation of Products. There is constant progress in the sciences on which pharmacy rests, hence even though many manufacturing processes remain the same fundamentally, it will be obvious that changes must occur as our knowledge increases. Many manufacturers maintain research laboratories where highly trained pharmaceutical chemists devote their entire time to the study of improving the processes of manufacture, with the view of improving the quality, uniformity and stability of the finished product, as well as with the view of reducing labor and waste. Such research work requires much time and money but becomes profitable when large scale operations can be improved. It obviously would be unprofitable to spend time on such improvements unless the quantity production is involved. This feature of specialization has a very beneficial effect on pharmacy as a whole in that it makes possible more rapid progress in the quality of medicinal products than could be made under a system which did not involve such high degree of specialization. Let us consider some practical examples: Cod Liver Oil has been sold in drug stores for a hundred years or more. It had a popular reputation for being a valuable product long before science was able to explain its value. Now, we know that it is one of the richest sources of two important vitamins. Together with the development of our knowledge of vitamins, we learned that some vitamins were easily injured or lost. Even before it was generally known to scientific workers in the field that vitamin A could be destroyed by atmospheric oxygen, the Squibb Laboratories perfected a process for rendering, refining, handling and bottling cod liver oil which avoided contact with air from the time the oil leaves the liver until it is used by the consumer. Other research work on cod liver oil involved the yield and resulted in increasing the oil available from a given quantity of liver so that the oil made in the Squibb plants today not only represents a product superior to that ordinarily produced, but a larger amount of oil is obtaind, thereby reducing production costs and offsetting to a certain extent the added expense brought about by protecting the vitamins.

The U. S. P. X directs that Tincture of Aconite be made by percolating the drug with a hydro-alcoholic mentruum. Research work done in manufacturing laboratories has shown that Tincture of Aconite so made is unstable and will soon lose its physiological activity. If, however, a small amount of acetic acid is added to the men-

struum for exhausting the drug and the finished preparation adjusted to the proper hydrogen ion concentration, a relatively stable preparation will result. Many pharmaceutical products are thus investigated by the manufacturer in order to eliminate difficulties that exist in preparations when made in accordance with the best knowledge that was available at the time the last revision of the Pharmacopœia or National Formulary occurred.

The formation of peroxides on aging has always been considered an inherent property of ether. No known treatment of ether prevents their formation. Some years ago the Squibb Laboratories, as a result of extended research, found that copper acts as an anti-catalyst and that the storage or packaging of ether in copper containers would prevent the formation of peroxides.

These examples are illustrations of how research brings about the production of better and more stable products.

The Use of Power and Machines. In small operations, all the work is necessarily done by hand. In large operations power becomes an important factor. Power derived from the use of steam or electricity is very, very cheap as compared with power furnished by the hands of men. It may appear that relatively little power is needed for certain pharmaceutical operations, but when we analyze these operations we find that it is probably more than it seems on first thought. Let me illustrate by describing the manufacture of Fluidextract of Ergot. All drugs are purchased whole, as adulteration and sophistication are much more difficult to detect when a drug is ground. The first step, therefore, after the drug has been selected, purchased and received, is grinding it. By means of power one can grind a ton or more of ergot in a day's time. With proper equipment and power one can defat it in two days' time, recovering practically all the solvent necessary for extraction. The solvent is separated from the drug by means of power, distilled by means of steam, and the drug is freed of solvent by evaporation and drying under vacuum, again using power to create the vacuum. Vacuum is used to maintain a low temperature during this evaporation as ergot is easily injured by high temperature. Can you visualize the labor, fire hazard and cost of doing all this on a small scale? And we have only carried the process far enough to start making our fluidextract! In chemical operations the use of power is much greater. Aside from the use of power, quantity production makes possible the use of ma-

chines—machines which often are specifically developed to do a definite job, not only in the manufacturing operation but also in the packaging operation which is always a necessary step before the product can be distributed to the store or the ultimate consumer. An excellent example of such specialized machinery is that used for packaging products in collapsible tubes. All of us have dispensed ointments in the prescription department in a collapsible tube and know what is involved to place the ointment into a tube by hand and get that tube ready to hand to the customer. A modern machine will fill the tube, close the bottom, wipe off any surplus which may be squeezed out, fold it over twice, make a clip out of a strip of metal, place this clip over the folded bottom and squeeze it in place so as to seal the tube, and lift the finished tube out of the machine. It will handle 20,000 tubes in eight hours and requires but a single operator to place the empty tubes into it. As a general rule, a second operator is placed at the delivery end of the machine as inspector to see that any imperfect tubes are culled out. Imagine how many people would be required to do this same thing by hand. Tubes are cartoned, labeled and wrapped, cans or bottles filled and sealed, by other machines with similar speed.

Greater Uniformity of Products, Their Proper Control and Standardization. All of this work, of course, tends to bring one very important feature into pharmaceutical products, namely, uniformity, but what has been mentioned so far is not sufficient. The most important factor producing uniformity and reliability lies in what the manufacturers call control work. The Control Laboratory is the analytical department in a pharmaceutical manufacturing establishment. Its duty is to test and standardize every product that is produced. In the Squibb Laboratories this work invariably includes applying all the U. S. P. or N. F. tests, and in most cases additional tests, because our high standard makes them necessary. This, of course, frequently includes chemical and sometimes physiological assays. Without such control it would be impossible to provide products which are always uniform, pure and reliable. Of course, only such products as meet the standards laid down are released for marketing.

Research on New Products. While from the standpoint of existing products and their quality, this feature plays no part, it nevertheless represents an extremely valuable and important field in adding

to the world's scientific knowledge and is largely responsible for the rapid strides that the present age is making in the development of agents for the cure or alleviation of disease. The time has passed where research is easy to do or new products easy to discover; they are no longer, or at least but very rarely found by accident. All that is easy has been done and found. Today the development of better products and new remedies depends upon systematic investigation, frequently covering years of time and conducted by the most highly trained and skilled men that our universities can produce. A great deal of such work is done in modern manufacturing plants. The cost of such research is so great that it would be practically impossible for an individual to undertake privately for negative results are often obtained.

Having outlined the several important advantages brought about by present day pharmaceutical manufacturing on a large scale by capable organizations, I believe you will agree that it would be impossible to have the benefits of any of these advantages if specialization were not developed to this degree or if large corporations commanding the effort of many highly skilled workers and scientists and the advantages derived from millions invested in equipment and facilities could not combine these agencies to bring about such results. We will readily grant that great benefits are created by this system, but have we considered who is the beneficiary? Pharmacy as a whole shares in the benefits; however, the greatest beneficiary unquestionably is the ultimate consumer. He receives the main benefits resulting from the research work that brings about greater uniformity, greater purity and greater reliability in existing products, as well as the steady replacement of existing products by newer and better ones. He receives the major portion of the savings that result from the buying power, the use of power and machines and the various other advantages involved in quantity production, for there is as keen competition in the manufacturing field as in any other and while the manufacturers must, like all who render a service, obtain a profit or go out of business, they also find it necessary to do their utmost to maintain their standard of quality and keep prices down to a minimum, for otherwise competitors will take their business.

So important are the advantages which accrue from specialization that it would be impossible to produce good products today except by these means. We could not produce pharmaceuticals by the methods in vogue fifty years ago and meet today's standards. We

could not satisfy the public, the medical or pharmaceutical profession without the combination of all the advantages that have been outlined. In order to make these facilities available, so much money and so many men who have specialized knowledge and training are necessary and have to be brought together that there is no other solution than the present day corporation. It makes possible such joint effort, and this brings us to another thought: Who are the men who do all this work in these corporations? They are pharmacists—the same men who might have run a drug store. They had a particular liking for and specialized in this particular field. How far they go, *i. e.*, whether they are analytical chemists in the employ of such corporation or whether they are the managers or presidents thereof, depends largely upon the capacity of the individual and the training and experience he has had. Today the scientific work done by our large manufacturing establishments such as Squibb's, is so great and so involved that men more highly trained than required for the retail pharmacy are absolutely necessary, but the best men are those who served their apprenticeship in the drug store, who studied pharmacy and then built on this foundation by further studies and continued work until they obtained their Ph. D. degree and gained the required experience. Men of this type find it easy to make connections with big institutions and if they have brains and ability and are willing to work hard, they not only find connections but advance rapidly. There is competition, of course, but the higher they go the less the competition. Really good men are scarce.

I wonder if you have given much thought to how great a foundation is pharmacy for what we might be pleased to term more highly specialized knowledge? I prefer to include all of the higher knowledge used in our laboratories in pharmacy. In last analysis, the men are pharmacists for they produce and develop the products that are used in the treatment and cure of disease. Sometimes I hear young men say that they want to go beyond pharmacy. That is not what they really mean—they mean they want to go higher in pharmacy.

I know of no field which offers greater opportunities or a wider range for specialized activity than pharmacy; in fact, its range is so broad that it covers everything from the most highly specialized merchandising activities to the most highly specialized scientific activities. The education that the individual in the field requires, of course, should be determined by the particular branch he is interested in. Pharmacy is so broad that one cannot cover the whole field. We

must specialize in some branch of it and not all branches require the same degree and quality of training. It is for every one of us, therefore, to choose the particular branch or field that we are most interested in, most fitted for and hence most likely to be successful in, and thereby determine what specialized education and training we must have.

Every pharmacist needs the fundamental pharmaceutical training that he obtains in a pharmacy course such as you are taking. If one wants to specialize in the commercial side, one can profit by studying salesmanship, advertising, accounting, management, etc. If one enters the manufacturing field, one may want to study purchasing, engineering, pharmacology or cost finding, for the field requires everything from traffic manager and accountant to engineer and organic chemist. Some men accomplish much with a limited education; others accomplish little with an excellent education. Education alone will not make a man a success.

Education is only a set of tools. A good workman can do splendid work with limited tools and a poor workman will do poor work no matter how good his tools. Obviously, a good workman will do better work or more work if his tools are the best that can be produced for the particular work in hand. The same is true of an education—a good man will do more and better work if he is trained and educated along the right lines and will reach his logical position in the least time. The all important thing is knowing how to use an education. Furthermore, we must remember that even the man who leaves the university with a Ph. D. degree has merely a foundation whereon he can build. His building stones are practical experience. A man just out of college, no matter how highly he is trained, has but limited value in industry until he has become familiar with the business; until he has learned how to work and properly apply his specialized knowledge to the problems confronting it. He should choose the right house to gain the necessary experience. While he cannot earn much at the start, if he has good sense and knows how to use his education it will not take him long to get ahead and become an important and valuable man.

At times I have noticed a tendency on the part of men who started as pharmacists, later specialized, and who then apparently became ashamed of being pharmacists. They call themselves chemists. Pharmacy has a much richer history, is much older and has a far greater heritage than chemistry. In a way, chemistry is the child

of pharmacy. Undoubtedly much of the credit that belongs to pharmacy has gone to chemistry through the work of pharmacists being reported in the scientific press as the work of chemists. Every pharmacist owes it to his profession to be loyal to it and to advance its scientific standing. Every pharmacist who specializes in one of the higher scientific branches of the field should publish the results of his work or researches in the pharmaceutical press, then pharmacy will regain and retain the position which is justly due it. It is not only no more than fair but greatly to their individual advantage that those who make their living out of pharmacy do at least that much in return. American pharmacy has excellent scientific journals, one of which antedates the American Chemical journals by many years. These journals have a place in every scientific library.

Whatever field of pharmaceutical endeavor you may choose, I hope I may at least make one lasting impression, and that is that you will always be loyal to pharmacy and do as much for it as it has done for you.

One other thought that I should leave with you before closing is the importance for you who are ambitious and want to reach a high position in your field to cultivate contact with leaders in Pharmacy—the men who do things and the men who amount to something. You may wonder how you can make these contacts. Nothing is easier. Join the American Pharmaceutical Association which counts among its members and leaders the greatest men in contemporary American Pharmacy. By joining an association, of course, I mean to take an active part in its affairs. You must attend the meetings and you must do that which you can do and have an opportunity to do as a member. If you do this, you will in time know all the most important men in pharmacy and have an opportunity to work elbow to elbow with them in committees and other association activities. Through such contact you will learn from them things which you will find of great value to your progress.

NEW IODO DERIVATIVES OF PHTHALEINS

By Frederick R. Greenbaum, D. Sc., Philadelphia, Pa.

HALOGENATED phthaleins have recently aroused a great deal of interest. They have been introduced for choleocystography by E. A. Graham and his co-workers.[1] He investigated tetraiodophenolphthalein and tetrabromphenolphthalein. Today tetraiodophenolphthalein as a sodium salt, tetrabromphenolphthalein, and tetrachlorphenolphthalein are prepared and marketed by a number of American manufacturers. They are being used in choleocystography.[2]

The very unpleasant side reactions that occur after intravenous injection of these compounds show that they are still very toxic, and hence a search for new iodine compounds in this series of phthaleins was indicated. The iodine compounds were preferably synthetized on account of the high atomic weight of the iodine, and for the purpose of choleocystography was absolutely essential to make these drugs efficient.

Previous to this time, halogenated phthaleins have been considered important from two points of view: First as indicators, and second for spectra absorption. Tetrabromphenolphthalein and tetrabromfluorescein were studied by D. L. Pratt, F. B. Doam and A. W. Harvey.[3]

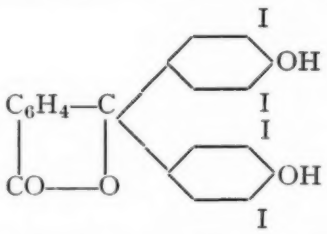
For this investigation, the two different isomers of tetraiodophenolphthalein, the ∝-tetraiodophenolphthalein and then the β-tetraiodophenolphthalein were prepared. Then a completely saturated iodine compound of phenolphthalein was synthetized, namely octoiodophenolphthalein, which as far as I am aware has not been prepared before. This compound should prove of immense interest in choleocrystography as it has the highest molecular weight of them all. Its exceedingly high content of iodine should prove very advantageous in this field.

The introduction of iodine into a nitrated phenolphthalein resulted in a diodo-dinitro-phenolphthalein, and iodine introduced into dinitrofluorescein gave di-iodo dinitrofluorescein. Metacresolphthalein gave diodo-metacresolphthalein. Rhodamine B gave by one method a mono-iodo rhodamine B, and by using another method a diodo-rhodamine B was obtained. Thymolphthalein gave when treated with iodine a mono-iodothymolphthalein, but no diodo compound could be prepared.

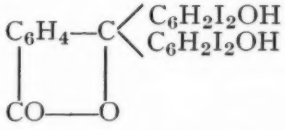
The introduction of iodine was accomplished by several methods. Phenolphthalein is the phthalein which is the easiest to halogenate as the higher homologs often require more energetic methods used than the one in the case of phenolphthalein. The iodo compounds obtained were analysed for iodine by the Carius' method.

Experimental Part

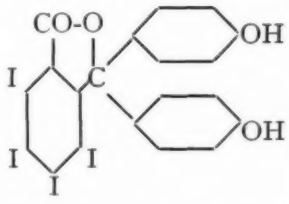
∝ *tetraiodophenolphthalein* of the following structural formula was prepared by the well known method of Classen and Loeb.[4]



It is an amorphous white powder, insoluble in cold or hot water and insoluble in acids, soluble, however, in hot ethyl alcohol, in ether and other organic solvents, and soluble in dilute alkalies with a blue color. This color disappears on the addition of more alkali. The compound decomposes at 220 C, giving off vapors of iodine. The compound analysed for iodine gave 61.6%, and calculated to contain 61.8% of iodine.



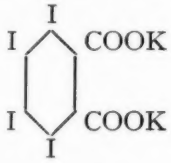
In order to prepare the isomer to the above compound, namely the β-tetraiodophenolphthalein, the structural formula of it looks as follows:



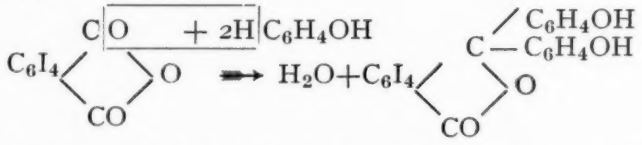
It contains the four atoms of iodine in the phthalic acid ring, while the alpha compound contains the iodine in the phenolic rings.

It was necessary to first prepare tetraiodophthalic acid anhydride, and then to fuse this compound with phenol to form β-tetraiodophenolphthalein.

Tetraiodophthalic acid anhydride was prepared according to D. R. P. 50177, January, 1889,[5] in the following way: 20 g. of phthalic acid anhydride was dissolved in 480 g. of 15% SO_3 containing fuming sulphuric acid, and was heated to 90°-100° C. Then 80 g. of iodine was gradually added and the temperature raised to 180° C., and kept there until the reaction was over. It was then allowed to cool, the acid was decanted, washed with sodium bisulphite, filtered and washed with SO_2 containing water to remove free iodine, and recrystallized from hot glacial acetic acid. The compound obtained represented yellow prisms with a melting point of 134° C. It is insoluble in water and organic solvents, soluble in hot glacial acetic acid and also soluble in hot potassium or sodium hydroxide under formation of the potassium or sodium salt of tetraiodo phthalic acid of the following formula:



In order to prepare now the β-tetraiodophenolphthalein, the tetraiodophthalic acid anhydride is fused with phenol in the following manner: 1 mol. of tetraiodophthalic acid anhydride, 2 mols. of phenol and 2 mols. of stannic chloride are heated in an oil bath to a temperature of 140 C. for several hours. At first the compounds begin to melt, but soon under the dehydrating influence of stannic chloride a chemical reaction takes place, which is evident by the change in color from a light yellow to a pink, to a red, and finally to a dark red. A combination occurred according to the following equation:



The dark red fusion obtained was extracted after cooling with hot water to dissolve the stannic chloride. The residue is dissolved

in warm dilute (15-20%) sodium hydroxide solution, and this pink or reddish solution is filtered off from the insoluble portions which consist of unchanged tetraiodophthalic acid anhydride. The filtered solution is acidified with dilute hydrochloric acid, filtered, washed, redissolved in sodium hydroxide, acidified again and filtered, and washed with hot water until free from acid and dried. The analysis gave 57.75% of iodine and calculated for $C_{20}H_8O_4I_4Na_2$ = m. w. 866, should be 58.6% of iodine.

The free β-tetraiodophenolphthalein represents an amorphous powder insoluble in cold or hot water, insoluble in all common organic solvents, but soluble in alkalies with a pink to a reddish color which disappears on addition of strong alkalies. The α-tetraiodophenolphthalein gives a blue color with dilute alkalies.

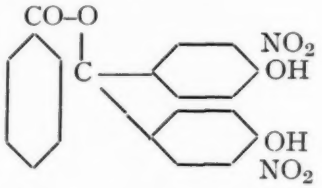
From this β-tetraiodophenolphthalein, the *octoiodophenolphthalein* was prepared as follows:

20 g. of β-tetraiodophenolphthalein was dissolved in excess alkali, and to this solution 72 g. of iodine which was dissolved in 84 g. of 20% sodium hydroxide solution was added under stirring and heated to boiling. Then it was gradually acidified by adding in a fine stream glacial acetic acid, under constant stirring and heated to a boil for half-hour, after this time it was neutralized with sodium hydroxide solution and then rapidly acidified with hydrochloric acid. It was again heated to a boil, allowing the supernatant solution to settle, decanted, and then filtered off the precipitate and then washed with water until free from acid. The precipitate was redissolved in sodium hydroxide, sodium bisulphite added to the solution acidified which precipitated the iodo compound and at the same time liberated sulphur dioxide from the sodium bisulphite, this removes any free iodine included in the precipitate of octoiodophenolphthalein. The precipitate was then filtered off, washed thoroughly with water until free from acid or any other impurities, and dried in a vacuum dessicator to constant weight. The analysis gave 76.25% for iodine and calculated for $C_{20}H_6O_4I_8$ (m. w. 1326) the iodine content should be 76.60%.

Octoiodophenolphthalein is a yellow crystalline substance insoluble in cold or hot water, easily soluble in dilute alkalies. the solution having a faint greenish color. This substance on account of its high molecular weight (1326) and its high content of iodine 76.25% is particularly suitable for experimentation in choleocys-

tography, and the attention of physicians working along these lines should be directed to this new and very interesting iodophthalein.

The next iodophthalein prepared used as a starting material dinitrophenolphthalein. Dinitrophenolphthalein was prepared according to the German patent in the following way: 100 g. of phenolphthalein was dissolved or suspended in 100 cc. of glacial acetic acid, and is then gradually treated, under cooling and stirring, with a mixture of 70 parts of nitric acid (specific gravity 1.48) and 210 parts of conc. sulphuric acid, care being taken that the temperature remains at 20° C. The liquid after all the acid has been added gets slightly warm, and on cooling, and standing a yellow crystalline nitro compound of phenolphthalein is precipitated, which is filtered and washed. It is then recrystallized once from boiling glacial acetic acid and represents dinitrophenolphthalein.



Dinitrophenolphthalein is a yellow crystalline substance, melting point 196° C., insoluble in cold or hot water, soluble in sodium hydroxide with an orange color, and can be reprecipitated with an acid. It is slightly soluble in ethyl alcohol and methyl alcohol, slightly soluble in ether, easily soluble in hot glacial acetic acid from which it can be recrystallized. The analysis for nitrogen gave 6.75% and 6.93%, and calculated for $C_{20}H_{12}O_8N_2$ the nitrogen amounts to 6.86%.

This pure dinitrophenolphthalein was used for the introduction of iodine which resulted in the formation of *diododinitrophenolphthalein:*

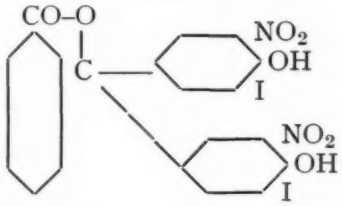
40 g. of dinitrophenolphthalein was dissolved in 40 g. of 20% sodium hydroxide and 300 g. of water. This solution was boiled and filtered. Then 120 g. of unsublimed metallic iodine was dissolved in 140 g. of 20% NaOH solution and 300 g. of water. The two solutions were now poured together, and 125 g. of glacial acetic acid was added slowly under stirring. This addition of acetic acid caused the liberation of iodine in a finely suspended state, and the substitution now takes place. It was heated to a boil and kept boiling for

about half-hour. Then 85 g. of 20% NaOH solution was added to neutralize the acetic acid, and then rapidly acidified with 125 g. conc. hydrochloric acid and 125 grams of water, boiled for a short time, allowed to settle, the supernatant iodine solution was decanted, the precipitate was washed with hot water, filtered and washed again with water until the wash water was almost colorless. Then the precipitate was dissolved in dilute sodium hydroxide, filtered and precipitated with conc. hydrochloric acid. This precipitate was filtered off and redissolved in NaOH, reprecipitated and washed free from HCl. If necessary sodium bisulphite was added before acidifying it, and then HCl added; this removes the free iodine present. This yellow precipitate was then thoroughly dried on a steam bath and then in a dessicator.

The analysis for nitrogen using the Kjeldahl reduction method and for iodine using Carius' method gave the following results:

calculated for $C_{20}H_{10}O_8N_2I_2$	
for nitrogen	4.2%
found for nitrogen	4.3%
calculated for iodine	38.4%
found for iodine	38.21%

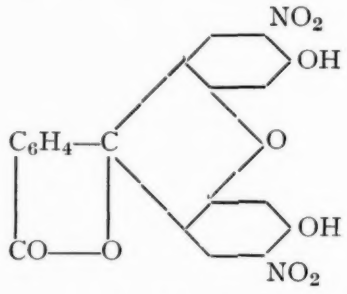
So that the formation of diododinitrophenolphthalein was established, and would have the following structural formula:



Diododinitrophenolphthalein is a light yellow amorphous powder with a melting point of 249°-250° C., insoluble in cold and hot water, soluble in NaOH with an orange color, insoluble in the usual organic solvents, soluble in glacial acetic acid. No more iodine can be introduced into the phenolic rings as all the ortho positions are occupied.

The next higher homolog of phenolphthalein, namely fluorescein was nitrated according to Beilstein.[7] One part of fluorescein was dissolved in 10 parts of conc. sulphuric acid kept at 0° C., and 2 parts of conc. fuming nitric acid was added, then poured on ice and filtered, the precipitate was washed, redissolved in methyl alcohol, filtered and precipitated in H_2O, filtered and dried.

The analysis for nitrogen gave 6.51%, while calculated for $C_{20}H_{10}O_9N_2$ gave for nitrogen the value of 6.6%. So that the dinitrofluorescein of the following formula was obtained.



It represents a yellowish orange powder, soluble in sodium hydroxide with a reddish-blue tint, insoluble in cold or hot water, and insoluble in organic solvents.

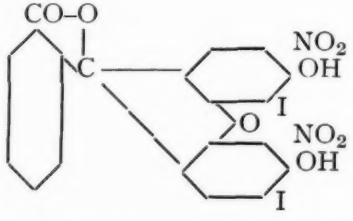
The introduction of iodine into dinitrofluorescein gave a new derivative *e. g.,* the dinitrodiodofluorescein, which was prepared in exactly the same way as the diododinitrophenthalein.

This method of introduction of iodine as described above proved satisfactory in all fluorescein derivatives and in many other phthaleins.

The diododintrofluorescein, when analysed yielded for $C_{20}H_8O_9N_2I_2$

for nitrogen calculated	4.1%
for nitrogen found	4.1%
for iodine calculated	37.7%
for iodine found	37.1%

So that the following structural formula must be assigned to this compound:



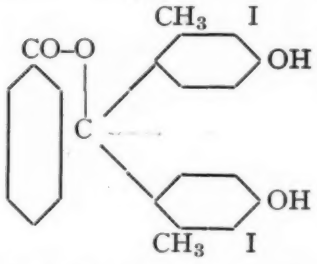
It is an orange-red amorphous powder, insoluble in cold and hot water, soluble in ethyl and methyl alcohol, and soluble in ether,

soluble in caustic soda solution with a blue color, and on acidification the diododinitrofluorescein is precipitated.

Metacresolphthalein is a yellowish-brown amorphous powder which was prepared by fusing meta-cresol and phthalic acid anhydride together in the same way as orthocresolphthalein is prepared according to Beilstein.[7] Metacresolphthalein is soluble in dilute NaOH giving a purple color, and is precipitated with mineral acids. It is soluble in ethyl alcohol and methyl alcohol, and all common organic solvents, in concentrated sulphuric acid it dissolves with a brownish color.

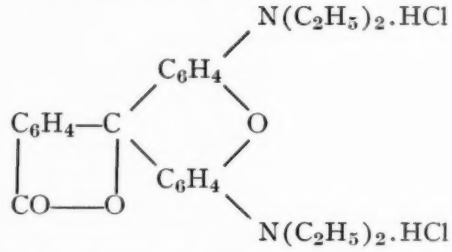
From metacresolphthalein an iodo compound was prepared and proved to be *diodometacresolphthalein* in the following manner: 10 gms. of metacresolphthalein was dissolved in an excess of caustic soda. This solution was filtered and 20 gms. of iodine and 20 gms. of potassium iodide dissolved in 100 cc. of water were added gradually under stirring for two hours, acidified with hydrochloric acid, filtered and washed, redissolved in sodium hydroxide, and reprecipitated with HCl. This procedure was repeated twice, then filtered and washed with water to free from HCl, and dried on a steam bath and analysed:

The analysis calculated for $C_{22}H_{16}O_4I_2$ gave for iodine 42.4%, and the iodine found was 42.0%. Therefore the formula of this compound looks as follows; with a molecular weight of 598.



Diodometacresolphthalein is a brown amorphous powder, melting point of 214° C., insoluble in cold and hot water, insoluble in ether, somewhat soluble in ethyl and methyl alcohol, very slightly soluble in dilute sodium hydroxide, on heating it dissolves to form a dark brown solution. It is interesting to note that this exhaustive method for the introduction of iodine does not furnish a tetraiodometacresolphthalein, as would be expected, but only a diodometacresolphthalein in spite of the fact that the four ortho positions are according to the above formula not occupied

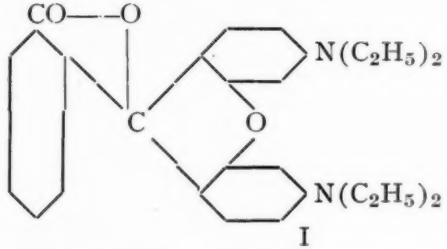
The next compound tried was rhodamine B. The commercial compound available is the hydrochloride of tetraethyldiaminophenolphthalein of the following formula:



This rhodamine B was treated by two methods for the introduction of iodine. The direct addition of a solution of iodine and potassium iodide to an alkaline solution of rhodamine B resulted in a monoiodorhodamine as the analytical figures show:

calculated for nitrogen	4.90%
found for nitrogen	4.60%
calculated for iodine	23.30%
found for iodine	22.70%

So that the compound obtained was a moniodo compound of this formula:



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It is of course clear that this is an unsaturated compound, but every attempt to introduce more iodine by the use of this method failed. At last the following method was tried and resulted in a diodorhodamine B: 2.2 gms. of highly purified rhodamine B was dissolved in 200 cc. of water, and to this solution 2.3 gms. of iodine-trichloride dissolved in 100 cc. of water containing 10 cc. of conc. hydrochloric acid was added. Immediate precipitation of a reddish flocculent compound occurred. This was filtered off and washed with water until all the acid was removed, then dried and analysed. The analysis shows:

Calculated for nitrogen (for a diodo cmpd.)	4.0%
found for nitrogen	3.9%
calculated for iodine	36.4%
found for iodine	36.3%

So this undoubtedly shows that the compound obtained was di-iodo-rhodamine B.

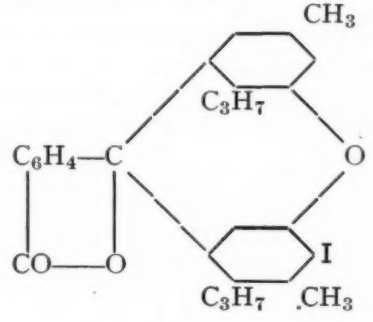
It represented a reddish-brown powder, somewhat soluble in cold water and hot water, insoluble in dilute alkalies, insoluble in acids, very soluble in ether, in methyl and ethyl alcohol. The low solubility of this compound is undoubtedly a disadvantage for medical purposes.

The last phthalein which was included in this study was thymolphthalein. 8.6 grams of thymolphthalein, obtained from the Eastman Kodak Company, was dissolved in 8.0 g. of 20% sodium hydroxide solution, and 60 g. of water, boiled, and to this solution 24 grams of iodine which was dissolved in 28 gms. of 20% sodium hydroxide. Then 60 grams of water was added, boiled for half an hour and acetic acid added, boiled again, neutralized with NaOH, and acidified with HCl, boiled, filtered, purified, and dried on a steam bath and in a dessicator.

In spite of this vigorous iodine introduction method only a monoiodo compound resulted, and attempts to use iodinetrichloride and iodinemonochloride resulted in the same monoiodocompounds as the analysis shows. For $C_{28}H_{27}O_3I$

iodine calculated	23.70%
and for iodine found	23.96%

So that the obtained compound was monoiodothymolphthalein of the following formula:



Monoiodothymolphthalein is a brown amorphous powder insoluble in cold or hot water, soluble in common organic solvents, soluble in alkalies with a blue color.

The following table compiles the analytical figures of the prepared iodophthaleins as well as their molecular weight; as the high molecular weight and the iodine content are of the utmost importance for their use in chloeocystography.

TABLE SHOWING THE ANALYTICAL FIGURES OF PREPARED IODOPHTHALEINS

Name of Phthalein	*Elements analysed*	*Theory*	*Found*	*Molecular weight*
α-tetraiodophenolphthalein	I	61.8	61.6	822
β-tetraiodophenolphthalein (Na salt)	I	58.6	57.75	866
Octoiodophenolphthalein	I	76.6	76.25	1326
Diododinitrophenolphthalein	N	4.2	4.3	
	I	38.4	38.21	660
Diododinitrofluorescein	N	4.1	4.1	
	I	37.7	37.1	674
Diodometacresolphthalein	I	42.4	42.0	598
Monoiodorhodamine B	N	4.90	4.60	
	I	23.30	22.70	567
Diodorhodamine B	N	4.0	3.90	
	I	36.4	36.3	694
Monoiodothymolphthalein	I	23.70	23.96	536

A glance at this table will show that from the point of view of high content of iodine and high molecular weight the best compound is undoubtedly octoiodophenolphthalein with an iodine content of 76.6% and a molecular weight of 1326. Next to this compound are the alpha and beta tetraiodophenolphthaleins, so that a pharmacological study of octoiodophenolphthalein and β-tetraiodophenolphthalein seems highly advisable.

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THE TRANSMISSION OF DISEASE BY FLIES

U. S. Public Health Service

EVERY PHARMACIST should know something about flies as carriers of disease. Such knowledge will enable pharmacists to intelligently cooperate and assist in any anti-fly campaigns in their communities. This article is intended to show the part that flies may take in the spread of certain diseases.

Flies may transmit disease in either of two ways. The first method is by mechanical transference whereby the insect becomes contaminated with the parasite or organism of disease as a consequence of frequenting filth and places where these agents are found, thus carrying the organism directly to food or drink partaken of by man. This is by far the most common method of conveyance. All kinds of flies may act as disease carriers in this manner, but the house fly is the principal offender owing to its prevalence and its great tendency to frequent filth. The stiff hairy parts of the fly are particularly adapted to the transference of contagion in this manner.

Experiments have been conducted to show the length of time flies may carry the organisms of infection. This time varies. If conditions are favorable there is little doubt that bacteria may be transferred in this manner after several days. If the organisms are taken into the intestinal tract of the fly, this period may be lengthened. When it is realized that milk, which is one of the best media for the growth of bacteria, may be contaminated by flies merely through

the act of feeding and that "clean flies" may even derive infection from those which have but recently visited the outhouse or the stable, the danger of food contamination may be conceived. The second method of disease transmission is by what is known as inoculation. Inoculation is the actual injection into the system, in this case by the insect, of organisms or parasites. These are known as pathogenic organisms. Fortunately, disease cannot be transmitted in this manner by flies which do not bite, else our safety would be far less than at present. The blood-sucking varieties are the only ones which are dangerous in this respect. In America these varieties are relatively infrequent. The mode of transmission is similar to that in which malaria is conveyed by the mosquito, typhus fever by the louse, and plague by the flea. The parasites of organisms derived from the blood of the infected person are received into the stomach of the fly where they undergo changes requiring a specified period, and are subsequently inoculated into a second individual. The diseases that may be transmitted by flies are typhoid fever, diarrhea, cholera, dysentery, paratyphoid, intestinal parasitic infections, sleeping sickness and a number of others.

Typhoid fever is the most common and important infection of man conveyed by flies. It is an acute infectious disease of bacterial origin contracted only by taking into the system the bacteria containing discharges of one actually ill of the infection or of some person who serves as a carrier thereof. It may be contracted through sewage-polluted drinking water, infected shellfish, or in other manner. It is essentially a disease of filth, but unless means are established for the transference of such filth to the mouths of persons the infection never develops. Flies frequently serve as a means of this transference and are, therefore, in part responsible for the spread of typhoid fever.

During the Spanish-American War the attention of the American people was called dramatically to the fly as a spread of typhoid fever. Hundreds of soldiers died from this disease, from this altogether preventable infection. The conditions which prevailed during the Spanish-American War exist in thousands of American communities today. We may look with horror upon the unnecessary sacrifice of life which ensued during the war with Spain, yet within our very vision identical conditions prevail and we remain undisturbed. The unprotected and unscreened outhouse in the country

and in many villages where sewage systems do not exist, constitutes a serious menace to the health of any community. Sooner or later such a place is bound to become the depository of typhoid excretions, and that moment becomes a hazard to every resident in the vicinity, for that very environment has created an insect host capable of spreading the scourge to every point of the compass. Typhoid fever bacilli never originates in flies themselves but are always derived from infected human waste. In unsewered districts this hazard is proportionately greater, but even in sections properly provided for in this respect the menace is never negligible if flies exist, due to the presence of carriers and cases of walking typhoid.

Flies which have access to outhouses and to tables may contaminate any variety of food. Milk is frequently subject to such infection, and numerous epidemics of typhoid with resulting deaths have been traced directly to dairies unprovided with proper facilities for the disposal of waste. Food purchased in fly-ridden markets may likewise be a source of contamination and if eaten uncooked may lead directly to illness. Cooked food of whatever nature may be contaminated subsequent to the cooking. This constitutes a serious menace to health. Quite irrespective then of the precautions which we take as individuals, we are all more or less exposed to the infection of typhoid fever through common sources. As a result of the laxity of others even when we ourselves may have exercised very precaution necessary to prevent the development of flies, our lives are frequently endangered. The eradication of flies then becomes a matter which concerns the entire community, and may be properly classed as community hygiene.

A second infection frequently conveyed by flies is summer diarrhea. This is more particularly a disease of children, but adults are also susceptible. In 1926 in the Registration Area of the United States, 28,374 infants under two years of age died from diarrhea and enteritis, the infectious nature of which has now been definitely determined. Bacteria of various varieties are known to be responsible for the disease. The sources of infection are much the same as in typhoid. The organisms that cause the disease reach the alimentary tract as the result of uncleanliness, infected food, and very possibly by contamination of hands or food through the activities of flies. The evidence against the fly as a conveyer of infection is largely circumstantial, yet so conclusive is it that no one would hesitate to

place the responsibility upon the insect. If we wish to save the lives of babies, the first step in the process is the eradication of flies.

Cholera and dysentery which are primarily intestinal infections conveyed in the same manner as typhoid, are unquestionably at times disseminated by flies. Fortunately cholera is a rare affliction in this country, originating only from imported cases, but epidemics of dysentery are not uncommon, being especially prevalent in institutions, camps and districts where insanitary conditions prevail.

In addition to these intestinal diseases, certain other affections, more or less closely related to them, may at times develop from the activities of flies. Paratyphoid, sometimes called the first cousin of typhoid fever, and food poisoning are to be considered in this category. More important still, however, are the numerous parasitic worms, such as the various species of tape worm, the hookworm, and even those of rarer forms, all of which are continued through the media of eggs contained in the waste of infected persons.

In addition to the diseases cited there are numerous other conditions where the possibility of fly transmission has at least been considered, although definite proof has been difficult to obtain of the truth of the theories advanced. In the majority of such conditions infective secretions are present. These are capable of being transferred through the action of flies, either directly or through the medium of food to healthy persons. Tuberculosis may be mentioned as an example of such a condition. Access to tuberculosis sputum by flies is not only disgusting from an aesthetic standpoint, but, potentially at least, of serious danger. The infectious disease of the eyes, trachoma, is probably conveyed at times by these insects. Anthrax, which occasionally affects man and which is rapidly fatal to cattle and sheep is another disease in the spread of which the fly is a factor.

In short, the fly is a distinct menace to health and should be treated as a menace; exterminated. Swatting flies, commendable a pastime as it is, is not in itself as important as are eradicative measures which aim to eliminate the breeding places of flies.

MOSQUITOES

By the United States Public Health Service

IT IS IMPORTANT that every pharmacist should know something of the role played by insects in the spread of disease. In the last article the fly as a carrier of disease was discussed and explained. The purpose of the present article is to tell something about another insect which is a menace to health, namely the mosquito, particularly that mosquito belonging to the genus *Anopheles,* commonly known as the malarial mosquito.

Mosquitoes differ greatly in their habits. Some species of mosquitoes are most commonly found near the home of man. These species are almost exclusively found close to human habitations. This is particularly true of the species commonly known as the yellow fever and dengue mosquito. Another species which may be called the wild mosquito frequents the common salt marshes such as those which are found on the Atlantic coast and seldom frequents the habitations of man. A third class, sometimes called the semi-domestic class, may be found both about human habitations and in swamps and fields. It is to this semi-domestic class of mosquitoes that the genus *Anopheles* belongs. The genus *Anopheles* is the mosquito commonly associated with the spread of malaria and known as the malarial mosquito.

In order to understand the ways and means by which mosquitoes may be eradicated and malaria prevented it is necessary to know something about the life history and habits of mosquitoes. Mosquitoes pass through four stages, the first stage, the egg or embryo; the second stage, the larva; the third, or pupa stage, and fourth the imago or adult winged insect. The three earlier stages in the life of a mosquito are aquatic, that is, these stages are passed in water. A great many people still think that mosquitoes breed in wet grass, weeds or bushes, because they have seen the winged insects frequently resting in such places. Mosquitoes do not breed in vegetation or on the wet grass or bushes.

Mosquitoes differ not only in their habits but also in the character of their breeding places. The yellow fever mosquito and others of the first species mentioned, sometimes known as domestic mosquitoes, may be found breeding in almost any collection of water near human habitation. They have been found in old tin cans con-

taining water, in broken bottles, in tubs, and barrels, in cisterns and wells, in flower pots, in eave gutters, in stagnant roadside pools, ditches and puddles, sewers and cesspools.

The species of mosquito to which the malaria-bearing insects belong may be found breeding in partly filled water barrels, in the hoofprints of animals, in old tin cans, in hollow tree stumps, and in postholes. They usually seem to prefer, however, grass bordered pools, ditches through which water flows but slowly, the margins of lakes and streams, especially if these marginal reaches are shallow and are more or less choked with water plants and reeds which afford protection to the mosquito from small fish.

Some species of *Anopheles* breed frequently on the edges of fairly free running brooks. The wild mosquito selects a breeding place of much the same character. They are frequently found associated with the malarial bearing species, except that these breeding places are more or less remote from the homes of man, in swamps, coastal marshes both fresh and salt, and in forests.

Male mosquitoes are vegetarians. The females of many species of mosquitoes have developed a taste for blood and blood has become indispensable to nearly all female mosquitoes for the development of their eggs. The female mosquito usually lays her eggs upon the surface of the water. The eggs of some species float separately on their sides. This is true of the eggs of the *Anopheles*. The eggs of other species adhere and float in the form of an irregular mass, like a small raft. In a day or two, under ordinary conditions, the eggs hatch out into larvae, commonly known as wiggle tails. The larva is in reality an aquatic animal, but it is a true air breather. The larva of the malarial mosquito ordinarily rests and feeds at the surface of the water, it usually lies in an almost horizontal position, its tail touching the filmy surface of the water. While in this position the larva breathes through a very short breathing siphon.

The larvae of other species of mosquitoes move about more or less in search of food but at intervals of a minute or two they come to the surface of the water for air. Here, at the surface, they hang head down, attached by conical breathing tubes to the film surface. The mosquito remains in this larval stage for about a week. The length of time, however, that a mosquito remains in the larva stage varies with the species and for each species varies again with the temperature. The larva is then transformed into a curiously shaped creature known as the pupa.

The pupa remains quietly at the surface of the water except when disturbed. It has no mouth and does not feed. It breathes through a pair of tubes shaped very much like trumpets, which project from the under side of the throat. The pupal stage lasts for two or three days, at the end of which time the adult winged insect emerges from its pupal case through a rent near the breathing tubes.

As short a time as nine days is often all that is required for the life stages of mosquito development. Nine days from the time the eggs are laid, in many cases, the winged insect appears. The time depends upon the temperature and the abundance of food supply. Warmth favors the rapid development of the mosquito, cold retards the growth. Because of the fact, mosquitoes are much more abundant in the summer, early spring and late fall months in the temperate climates. In the tropics, wild mosquitoes become more abundant during the wet season.

Mosquitoes manage to pass through the rigors of the winter. The way in which this is done probably varies with the different species. The malarial mosquito, the *Anopheles,* hides in sheltered places, cellars, dark crannies, and out of the way nooks. Other species survive through the power of the larva or egg to resist cold. The larvae or eggs of some species will hatch even after they have been frozen.

Mosquitoes breed in water, in still water, and in the pools and grassy edges of running water. They lay their eggs on the surface of the water. These eggs float and in a few days hatch into larvae or "wiggle tails." These live in the water and in time turn into pupae or "tumblers" which turn into mosquitoes. These are four changes in the development of mosquitoes, just as there are in the development of butterflies. For mosquitoes, all these changes must take place and for *Anopheles* will take from twelve to sixteen days in summer weather—longer in cool weather. The larva of the malaria mosquito lies at the top of the water and parallel to it. The larvae of other mosquitoes hang from top head downward. If these hanging larvae are touched they will dive. If the *Anopheles* larva is touched, while it may dive, it will generally scoot backward along the top of the water. They are not a particle alike and once seen, no one will ever mistake one for the other. It is important to recognize the larvae of *Anopheles*—far more important than it is to recognize the mosquitoes themselves because this enables man to find the breeding places of these mosquitoes and destroy them while in the

larval stage. *Anopheles* prefers to breed in clean water in small shallow, shady pools with grassy edges. If grass is growing in these pools, so much the better. A marshy piece of ground with small pools among bullrushes and sedges is an ideal place. The grassy edges and quiet pools formed by obstruction on small streams are also favored places as are cattle tracks. They have no objection to running water unless the current is very swift. They occasionally breed in almost any collection of water unless it is very foul—shallow wells, water barrels, and tin cans, especially if these have leaves or grass in them or frog moss. Generally, however, they avoid barrels, cans and other artificial containers.

It takes usually about fourteen days for the egg to produce the mosquito. If a collection of water dries up completely in less than fourteen days it is not apt to breed mosquitoes. All mosquitoes have a bill and two palpi which lie close to the bill, one on each side. Outside the palpi are two antennae which spread apart. The antennae of the male are plume-like, those of the female are not. One can tell the male from the female because the male has plumes on his head. You can tell the *Anopheles,* malaria bearing mosquito, from the other kinds in the United States which do not convey malaria, by looking carefully at the heads of the mosquitoes. *Anopheles* have straight bills and palpi nearly as long as their bills. The females of the other kinds have short palpi except one kind which has a curved bill. There are other differences. The malaria mosquito is slight and graceful. The wings are generally spotted or dusky.

There is still another important difference. That difference is in the way that they rest on a wall. *Anopheles* rests in a straight line, frequently standing on her head. The others rests "humped up." This is a good way to identify the adult live mosquito and is the one method usually used in practice.

Anopheles rarely bite in the day time in the United States. The day mosquito of the South is the yellow fever mosquito. *Anopheles* is shy and easily driven off and will rarely bite you when you are moving about. She is more apt to bite you when you are asleep. Her bite is less painful than that of other mosquitoes and she does not sing so loudly. On this account when mosquitoes are much complained of they are rarely *Anopheles* and there can be many *Anopheles* about without much complaint.

THE ONE HUNDRED AND SIXTH ANNUAL COMMENCEMENT of the PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE

IN A NOVEL environment and with increased zest and spirit the ceremonies which brought to a close the 106th academic year of the College were attended by vastly greater numbers than ever before in the history of the institution. The new buildings and grounds compared to the old establishment afford a much more pleasant and more spacious accommodation for such occasions, and the hundreds who participated in the events of the closing week expressed in no uncertain language, their appreciation of the change.

The College Supper, when the graduating class was entertained by the College—was held Monday evening, June 4th, in the auditorium. Tuesday was Alumni Day—with class reunions, annual meeting, ivy-planting ceremonies, athletic contests, in which the faculty members displayed their prowess—class parades and an evening of fine entertainment. At this performance the broadcasting, televisional apparatus of the College was demonstrated for the first time by Professor Card of the Science Department. The reception given to this effective modern device was such that it may be demonstrated again at some distant time.

A dance terminated a day of real college entertainment—quite different from the somewhat formal performances of preceding years —but sparkling in spirit and enjoyed with a keener zest than ever before.

To Mrs. LaWall, Chairman of the Committee on Alumni Day exercises, goes the credit for having managed so effectively a departure from the formal and somewhat warped celebrations of other years. Mrs. Peacock, president of the Alumni Association, also deserves special mention for the facile and pleasant way in which she conducted the affairs of the association during her administration.

The Commencement Exercises were held in the Auditorium Wednesday evening, June 6th. Every seat in the vast room was occupied and every available standing space filled.

After the academic procession over the grounds of the College, in which class and faculty participated, the exercises were opened with

invocation by the Reverend Frederick R. Griffin. Honorary degrees (Ph. M.) were conferred on David F. Jones, South Dakota, a prominent retail pharmacist and president-elect of the American Pharmaceutical Association, and (*in absentia*) on Professor L. Van Itallie of Holland, for their services in the field of Pharmacy.

The graduation address was delivered by Dr. Josiah Harmar Penniman, Provost of the University of Pennsylvania, who conveyed to the College the greetings of a great University, and whose dignified, inspirational address, was typical of the fine-minded, learned gentleman who presented it.

Degrees were conferred by President Wilmer Krusen, by authority of power vested in him by the Commonwealth of Pennsylvania, upon the following groups of candidates who were presented to him by Dean Charles H. LaWall and Dean J. W. Sturmer.

Music for the occasion was provided for by Professor Hoffmeister and the Boys Orchestra of the West Philadelphia High School.

MASTER OF PHARMACY (Honoris Causa)

David F. Jones .....South Dakota
L. Van Itallie .....Holland

MASTER OF SCIENCE (M. Sc.) in Course

Card, Paul Q. .....New Jersey
Perkins, George W. ....New Jersey

BACHELOR OF SCIENCE IN PHARMACY (B. Sc.)

Freeman, Lewis G. .....Pennsylvania
Lewis, Edward, Jr. ....Virginia
Lo, Doris S. .....China
Nichols, Adley B. .....Wisconsin
Weeks, James Daniel ..New Jersey

BACHELOR OF SCIENCE IN CHEMISTRY (B. Sc.)

Beatty, John Coulter, Jr..Pennsylvania
Goeller, George Martin..New Jersey
Kitamura, Saburo .....Japan
Osol, Arthur .....Pennsylvania
Schmieg, Joseph Henry, Jr. .....Pennsylvania

BACHELOR OF SCIENCE IN BACTERIOLOGY (B. Sc.)

Miller, Ruth Emma .....Pennsylvania

BACHELOR OF SCIENCE IN PHARMACOGNOSY (B. Sc.)

Cawley, Ellen .....Pennsylvania
Stoneback, W. J. .....Pennsylvania

PHARMACEUTICAL CHEMIST (Ph. C.)

Balotin, Joel .....New York
Bohr, John Ernest .....Pennsylvania
Cooper, Harvey Harold, Jr. .....Maryland
McCormick, Elizabeth ..Mississippi
Paul, Charles H. .....Pennsylvania
Sahagian, Paul .....New York
Young, Vernon Tilghman .....Pennsylvania

GRADUATE IN PHARMACY (Ph. G.)

Ahlgren, Melvin .....Pennsylvania
Babcaukas, Algerd W...Pennsylvania
Barkan, Rose R. .....Pennsylvania
Barrow, John H. .....Pennsylvania
Barsky, Louis .....Pennsylvania
Beck, Joseph A. .....Pennsylvania
Beckman, Eleanor .....Pennsylvania
Beebe, Edgar T. .....New Jersey
Blandford, Thomas E. ..Pennsylvania
Bless, Isadore A. .....Pennsylvania
Blitzstein, Celia .....Pennsylvania
Bobb, Howard .....Pennsylvania
Bookstein, David A. ....Pennsylvania
Bourn, Frank .....Pennsylvania
Braund, Percival .....Pennsylvania
Bretz, Benjamin F. ....Pennsylvania
Bullock, John A. .....New Jersey
Cerone, Lawrence .....New Jersey
Chankin, Joseph .....Massachusetts
Chivian, Herman J. ....Pennsylvania
Cobello, Joseph F. .....Pennsylvania
Cohen, Morris .....Pennsylvania
Colantonio, Enis B. ....Pennsylvania
Cook, John G. .....Pennsylvania
Cooke, Harold A. .....Pennsylvania
Corbin, Sara .....Delaware
Cox, Arthur H. .....Pennsylvania
DeClemente, Joseph Angelo .....Pennsylvania
Della Rezza, Alfonso Ralph .....Pennsylvania
DeMedio, George Dominick .....Pennsylvania
De Vizia, Joseph F. ....Pennsylvania
Dezsy, Samuel A. .....New Jersey
Dienna, William A. ....Pennsylvania
Dorang, Harry R. .....Pennsylvania
Dorfman, Philip J. ....Pennsylvania
Dorman, Max B. .....Pennsylvania
Dorn, C. Eugene .....Ohio
Dundore, Roy Jones ....Pennsylvania
Duritz, William .....Pennsylvania
Escalona, Efrain .....Panama
Eshner, Samuel M. .....Pennsylvania
Evans, Raymond R. ....Pennsylvania
Fahey, Joseph .....Pennsylvania
Fees, Robert Kenneth ..Pennsylvania
Feinman, Jack Irwin ...Pennsylvania
Fisher, Milton Thomas..Pennsylvania
Forer, Morris .....New Jersey
Frank, Norman .....Pennsylvania
Freedman, Isadore H. ..New Jersey
Frieman, Herman .....Pennsylvania
Fry, Russell Edgar ....Pennsylvania
Gardner, Joseph L. .....Pennsylvania
Gold, Edward I. .....Pennsylvania
Gold, Emanuel .....New Jersey
Goldman, David .....Pennsylvania
Gottesman, Samuel .....Pennsylvania
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Green, Isadore Edward..Pennsylvania
Grobman, Frank H. ....Pennsylvania
Grobman, Robert E. ....Pennsylvania
Gruber, Julius J. .....Pennsylvania
Guzinsky, Harry .....Pennsylvania
Harrell, Helen Geiss ...Pennsylvania
Harris, Paul .....New Jersey
Heister, Morris Joseph..Pennsylvania
Henni, Frederick W. ...Pennsylvania
Hess, Milton J. .....New Jersey
Hirsh, Philip .....Pennsylvania
Holtz, Albert .....Pennsylvania
Hoover, Thos. Michael..Pennsylvania
Hopson, Robert C. .....Virginia
Houck, Harry J. .....Pennsylvania
Idczak, Chester J. .....Ohio
Jacobson, Edward H. ...Pennsylvania
Jaffe, Louis .....Pennsylvania
Jaspan, Martin .....New Jersey
Jaspan, Paul .....Pennsylvania
Jones, John Edward ....Pennsylvania
Kaigh, Max .....Pennsylvania
Keeney, Joseph Anthony.Pennsylvania
Keller, Albert .....Pennsylvania
Kingstone, William K...Pennsylvania
Kiszonas, Estelle .....New Jersey
Kornblith, Mildred .....Pennsylvania
Landy, Abraham .....Pennsylvania
Lanza, Edmund J. .....New Jersey
Lastick, Samuel W. ....Pennsylvania
Lehman, Harold K. ....Pennsylvania
Leoncavello, Salvatore M. Pennsylvania

Levin, William .....Pennsylvania
Lippman, Isadore .....Pennsylvania
Little, Paul S. .....Pennsylvania
Mackey, Paul George ..Pennsylvania
Maloy, Gerald V. .....Pennsylvania
Manis, Alexander S. ...Pennsylvania
Masknornick, Andrew J..Pennsylvania
McGrail, Joseph A. ....Pennsylvania
McKinstry, Robert D. ..Pennsylvania
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Miller, Garrett E. .....Pennsylvania
Miller, Lewis .....Pennsylvania
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Moyer, Charles W. ....Pennsylvania
Murr, Theodore R. ....Pennsylvania
Nerenberg, Louis .....Pennsylvania
Newhart, Claude J. ....Pennsylvania
Notari, E. R. .....Pennsylvania
Orlow, Hyman J. .....Pennsylvania
Ozeroff, Philip .....Pennsylvania
Pacenta, Anthony N. ...Pennsylvania
Paletz, Eugene .....New Jersey
Peck, Fred Wilbur ....Pennsylvania
Pepper, Joseph .....Pennsylvania
Pessano, William J. ....Pennsylvania
Piccolo, Michael Frank.Pennsylvania
Piscoglio, Sante .....Pennsylvania
Pitcher, Daniel G. .....Pennsylvania
Polis, David .....Pennsylvania
Popkave, Leopold .....Pennsylvania
Potocki, Peter P. .....Delaware
Pripstein, Louis .....Pennsylvania
Prynn, Sheldon L. .....Pennsylvania
Purcell, David J. .....Pennsylvania
Pyle, Ralph H. .....Pennsylvania
Rafferty, George J. ....Pennsylvania
Rauch, Arthur G. .....Pennsylvania
Reilly, John F. .....New Jersey
Rosenbloom, Jack Henry. Pennsylvania
Rowlands, Owen J. ....Pennsylvania
Rubin, Julius M. .....Pennsylvania
Saleeba, Aesop L. .....Pennsylvania
Schindel, David P., Jr...Maryland
Schofield, Alan L. .....Pennsylvania
Scovell, Charles L. .....Pennsylvania
Seaboldt, Robert L. ....Pennsylvania
Selditch, David .....Pennsylvania
Shafer, Edward L. .....Pennsylvania
Shapiro, H. M. .....Pennsylvania
Shapiro, Isadore .....Pennsylvania
Sirott, Myer .....New Jersey
Slifkin, Meyer .....Pennsylvania
Sneidman, Charles .....Pennsylvania
Sobel, Julius .....Pennsylvania
Sternberg, Israel L. ....Pennsylvania
Sterrett, John R. .....Pennsylvania
Stromwasser, Louis ....Delaware
Stumpf, Joseph J. .....Pennsylvania
Sutterlin, William K. ..New Jersey
Teti, Nicholas A. .....Pennsylvania
Tibbetts, Theodore R. ..Maine
Unangst, Parke W. ....Pennsylvania
Van Horn, Wm. F. ....Pennsylvania
Wasco, John Weldy ....Pennsylvania
Watt, Edwin D. .....New Jersey
Weadley, Albert L. ....Pennsylvania
Weisman, George .....Pennsylvania
Whalen, Florinel Alma..Pennsylvania
Williams, Glenn Vincent .....Pennsylvania
Yampolsky, Gabriel E...Pennsylvania
Yingst, Irvin H. .....Pennsylvania
Zebooker, Lillian .....New Jersey
Zeglin, Wlliam R. .....Pennsylvania
Zeugner, Charles .....New Jersey

CERTIFICATE IN CHEMISTRY
(Three-Year Course)

Horton, J. S. .....Pennsylvania

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(This does not include students who completed courses in these subjects for credits for a degree)

In Bacteriology

Bakerman, M. S. .....New Jersey
Goldin, Samuel .....Pennsylvania
Mallowitz, Ruth .....New Jersey
Rosenberg Charles ....Pennsylvania
Warren, Morris .....Pennsylvania
Wolcoff, Irene .....Pennsylvania

In Clinical Chemistry

Bakerman, M. S. .....New Jersey
Goldin, S. .....Pennsylvania
Hindman, W. .....Pennsylvania
Mallowitz, Ruth .....New Jersey

In Physiological Assaying

Rosemary, Arthur J. ...Pennsylvania
Weaver, Harry W. ....Pennsylvania
Severac, Dr. M. .....Pennsylvania
Fowler, Russell .....Connecticut

In Perfumery and Cosmetics

Llamas, Antonio G. .....Manila, P. I.

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Designated as "Distinguished"

With General Average of not less than 90%

Russel Edgar Fry
Albert Holtz
Samuel W. Lastick
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With General Average between 85% and 90%

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Celia Blitzstein
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With Honorable Mention to:

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Morris Heister
Albert Holtz
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Samuel W. Lastick
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Alfonso Della Rezza
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With Honorable Mention to:

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RUTH EMMA MILLER

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Albert Holtz
Arthur Osol

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ABSTRACTED AND REPRINTED ARTICLES

HOW BIG IS AN ACRE?*

By Alexander McAdie

THE writer has asked a thousand school children, who from time to time have visited various observatories with which he has been connected: "How many square feet to the acre?" and not once has the correct answer been given. The children guess wildly or stand mortified. He believes he might ask a hundred school teachers the same question, and if two answered correctly, these could be easily stumped by the further casual inquiry: "And how many square inches, would you say?" Perhaps, gentle reader, you would like to try the problem? You know what an inch is and you know that "acre" is a term quite frequently used.

Of the same groups of children, a second question was invariably asked: "How many cents in four hundred and thirty-five dollars and sixty cents?" There is a moment of hesitancy, then a flash of recognition, and a jubilant chorus booms forth: "Forty-three thousand five hundred and sixty." They always put the "and" in. They feel that they valiantly met the enemy and got the better of him.

But why this ability to answer so promptly a problem in values, and the complete failure to solve the problem in measuring an area?

Perhaps the explanation is to be found in this. A dollar is a hundred cents; but a link is 7.92 inches, and 625 square links make a pole, and 16 poles make a square chain, and 10 square chains make an acre. So one must multiply 7.92 by 7.92, then multiply this by 625, then multiply by 16, then by 10; and finally divide the total by 144. This gives, if you've made no mistake, 43,560 square feet. If you want the number of square inches, omit dividing by 144, and the answer is: 6,272,640 square inches in an acre.

There are two things to be noticed. We do not use a scientific and sensible unit to begin with; and the method of extension is unscientific, in that there is no constant and easily comprehended ratio of values. It is quite easy to devise a suitable unit and there is already

*Reprinted from *Measurement.*

a legalized method of extending values, but we do not try to use the system, although *it is used successfully* by a large majority of the civilized communities of the world and there is no valid reason against universal adoption. Great Britain and the United States are not wholly to be classed with the rest of the world, because, while the United States—also the English-speaking communities which make up the British Imperial Union—use a logical and scientific method in connection with money, they still retain—except in scientific usage—a cumbersome and antiquated system of weights and measures.

And so it is that the schoolboy must spend precious hours trying to memorize the relation of the foot to the rod, and the yard to the mile; or the square rod to the perch; or the gill to the gallon; or the tierce to the hogshead; the pipe to the butt; the tun to heaven knows what. Luckily for him, there is a limit to scholastic requirement, and the arithmetics generally add in fine type:

> These measures of capacity do not express any fixed measure, but are usually gauged and have their capacities in gallons marked on them.

Like ready-made clothes, they need a tag to tell how much they are worth!

Then there are the bushel and the peck. There are sixteen pints in a peck; but these are dry pints. There are eight wet pints to the gallon; but who would dare to trace the relationship between a gallon and a peck?

An ounce is a small thing, but not always the same thing. We now have two kinds of ounces, one contains 480 grains, one has 437.5 grains and is still considered a respectable ounce. And the pound? Ah—it is a fickle fellow! If, dear reader, you should step into the Mint and ask for a pound of gold—of course, you would go fully protected—you would get just twelve ounces, or 5760 grains. Come home now with your gold and buy a pound of golden butter. The honest groceryman will give you 16 ounces, or 7000 grains—or you can incarcerate him in jail, upon application to an inspector of weights and measures somewhere near the State House. Is not this another case of acquiring knowledge in Wall Street and paying for it?

But forget eatables like butter and sugar for a moment.

The winter is long and cold, and we cannot all go to the sunny South, or the golden Pacific Coast. We try to keep warm by buying and burning coal. We buy it by the ton. And how much is a

ton? Why, that depends upon how much coal you buy—and how much money you have. The United States Government requires in its fuel-contracts 2240 pounds to the ton. Many large corporations tell the coal barons to deliver likewise unto them the "long" ton. With them, a hundredweight means one hundred pounds, plus twelve more. For a ton is made up of four quarters each 560 pounds—those who devised the English system of weights here missed a fine chance to make a ton five quarters—or 160 stones. Everyone in America knows a stone to be just exactly 14 pounds, no more, no less. But, gentle reader, when you buy a ton of coal, you may get some stones to be sure in each ton, but the coal baron will see that you get just 2000 pounds. He gets 2240. That's that. An ounce is not always an ounce; a pound is not always a pound; and a ton is not always a ton.

Now let us come back to the school children and the size of an acre. There is no need of sticking to the link; but if we must, at least let us be able to answer how many links there are in any given piece of ground—call it an acre. A square link would be 404.6873 square centimeters. Ask foreign school children: "How many square links in an acre?" Philippine children, Mexican children, Russian children, German children, Swedish children, Spanish children, Austrian children, Belgian children, French children, in fact, all the children of the world except our own and those in Great Britain, would answer without delay: 40,468,730.

Is it not time that our school superintendents took a hand in the game? The Society for the Prevention of Cruelty to Children would undoubtedly be glad to second any effort to protect defenseless youngsters from the cruelty of memorizing ancient and no longer honorable tables of weights and measures. That the system fails utterly is attested by asking so simple a question as: "How big is an acre?"

NICOTINE AS AN INSECTICIDE*

By G. Fox Wilson, N. D., Hort., F. E. S.

Entomologist to the Royal Horticultural Society

NICOTINE ($C_{10}H_{14}N_2$) is the most useful and toxic substance entering into the composition of contact insecticides. It is a plant alkaloid, so that its effect, when used at the strength required to kill sucking insects, will not injure the most delicate foliage. All species of *Nicotiana* contain this alkaloid in strengths varying from 0.5-8.5 per cent. It possesses a high boiling-point (247° C.), and has a specific gravity of 1.011 at 15.5° C. Pure nicotine is a colorless, almost odorless, water-soluble, oily liquid, whilst the commercial product is dark brown and pungent. It rapidly undergoes oxidation on exposure to air, and should always be stored in air-tight metal containers. A serious drawback to the grower is its relatively high cost. During the years 1910-1916, the horticultural press agitated for official permission to allow growers to cultivate their own tobacco for spraying purposes. A suggestion was made that, provided compulsory spraying of the crop with lime-sulphur or copper washes was carried out, there would be no margin for abuse in using the foliage for illegal purposes. When purchasing the commercial product, a guarantee against fraudulent adulteration should be insisted upon. The most likely adulterants are water, ammonia and pyridine. The presence of the last-mentioned is difficult to detect, and the services of an analyst will be necessary.

Toxicity to Animals

Nicotine possesses a sharp, burning taste and is highly toxic to vertebrates. There are many people who, even if they inhale the fumes, are affected and overcome with giddiness and sickness. The action of nicotine on insects is to cause a complete paralysis of the motor centers brought about by a condensation of the vapor upon the walls of the tracheæ (breathing tubes), and subsequent absorption of the nitrogen atom by the nitrogen fat compounds that make up the nerve tissue, with the result that further absorption of oxygen is stopped and the insect is killed. Until recently, it was thought that

*Reprinted from *Chemist and Druggist*.

nicotine solutions passed into the tracheæ and penetrated into the integuments of insects, but it is now known that it is only the fumes from fumigants and the vapors from evaporated spray solutions and odoriferous particles from dusts which pass into the tracheæ and are widely distributed to all the tissues. Nicotine is far less certain in its action when used as a stomach poison against biting insects, on which it acts mainly as a repellant. Nicotine is used for horticultural purposes in the following forms: (I) As a contact wash against (*a*) sucking insects, *e. g.*, plant lice (aphides), capsid bugs, leaf hoppers (jassids), immature scale insects (coccids), apple sucker (*Psylla mali*) and thrips, and (*b*) biting insects, *e. g.*, the early larval stages of moths and sawflies and the leaf-mining larvæ of moths and flies; (II) as a dust against leaf-curling aphides and sawfly larvæ which cannot be reached by a spray; (III) as a fumigant against sucking insects under glass.

Application as a Contact Wash

The old method of preparing a nicotine wash was to make a water infusion of tobacco-leaf waste, but this was not satisfactory, as the operator was unable to ascertain the percentage of nicotine in the subsequent wash. For spraying purposes, the best form to use is commercial nicotine (95-98 per cent.) which, with the addition of soft-soap solution, is directly applied to plants. To prevent the removal of "bloom" on plants with waxy foliage, *e. g.*, carnations, cabbage and glaucous-foliaged spruce, saponin may be substituted for soap. Failure to ensure a satisfactory control against sucking insects with a nicotine wash may be due to the following causes: (i) Poor pressure—a pressure of not less than ninety pounds to the square inch is necessary to break down the waxy covering of certain species of aphides, particularly woolly aphis ("American blight") and mealy plum aphis and the spittle-like excretion of the cuckoo-spit insect; (ii) wrong type of nozzle—a nozzle which gives a penetrating cone spray is necessary; (iii) wrong part of the plant sprayed—most sucking insects congregate on the under-surface of the leaves and on the young tender shoots, and unless the wash is directed to these parts and the insects actually hit by the spray, a low mortality will result; again, a higher mortality against leaf-mining larvæ will result when the lower surface of the foliage is sprayed; and (iv) an absence of thoroughness—care should be taken to see that all infested portions

of the plants are sprayed, otherwise many insects will escape, and, owing to their high rate of fecundity, will again become a serious menace in a short time. The most satisfactory formula for sucking insects is:

Nicotine (95 to 98 per cent.) =	7½ oz.
Soft soap (potash) =	10 lb.
(or saponin = 2 oz.)	
Water =	100 gallons

The nicotine content must be increased to 10 oz. for young caterpillars.

Certain precautions must be taken in using this insecticide, *e. g.*, to refrain from spraying lettuce and other saladings with nicotine wash for some days before the plants are used for table, and it is also inadvisable to spray tender-foliaged plants in bright sunshine, as scorching will often result. The flower of chrysanthemums, dahlias and sweet peas are not discolored by this wash provided the application is made on a dull day or late in the evening. The disadvantages of a wet spray over a dust are: (i) The application covers a lengthier period; (ii) lack of penetration into curled leaves; (iii) difficulty experienced in traction over rough ground and hilly districts; and (iv) unsuitable water supplies.

Nicotine as a Dust

The finer the grade of dust, the greater efficiency both as to adhesiveness, penetration and killing power. An efficient dust must also be dry and non-absorbent. It is mixed with a carrier, *e. g.*, calcium hydrate, kaolin (hydrated aluminium silicate) or gypsum, so as to contain 2 per cent. of nicotine. The disadvantages are: (i) Relatively high cost; (ii) volatility—the action is slower than when used in solution; (iii) a lowered mortality if rain falls soon after the operation; and (iv) distress to operators if a wind springs up, forcing a cessation of operations.

Use as a Fumigant

It is used extensively as a glasshouse fumigant, and may be employed in conservatories provided that the doors leading into living rooms are made airtight. The most satisfactory method is to vaporize the material, which usually contains 50 per cent. nicotine, over a spirit

lamp. Many proprietary nicotine fumigants are composed of dried tobacco leaf-waste either in the form of shreds, mixed with a combustible medium, *e. g.*, sawdust, and moulded into the form of a cone or sheets impregnated with saltpetre and soaked in nicotine. Nicotine vapor possesses a selective action, and, whereas its efficiency against aphides and thrips is undisputed, it has little effect on the immature stage of white or "snowy fly," scale insects and "red spider." Open-air fumigation with tobacco waste has been carried out in Canada with marked success against apple sucker (psylla). The tobacco waste (360 lb. to the acre) is placed in small heaps, damped to prevent quick combustion, and ignited by means of a torch.

Compatibility With Washes and Waters

For reasons of economy in labor and time, it is urged that two or more washes be applied to fruit trees at the same time. Under certain conditions, nicotine-soap wash may be mixed without danger to plant life with the undermentioned insecticides and fungicides: Lead arsenate, Bordeaux mixture, lead arsenate and Bordeaux, lime-sulphur, lime-sulphur and lead arsenate, and also ammonium polysulphide. Danger may arise from the presence of soap in the contact wash, but its presence is necessary to increase the efficiency. As many commercial soft soaps contain free alkali and some lead arsenates are acidic, the result is that a chemical reaction is set up and soluble arsenic is formed which produces serious leaf damage. Provided that a neutral soap and a basic arsenate are used and the wash applied as soon as possible after mixing, the danger from scorched foliage will be reduced to a negligible quantity. A serious drawback, however, to the combination of a contact wash with either a stomach poison or a fungicide is the necessity for the first-named to be applied as a "drench" spray, whilst the others should be applied as a "mist" spray to allow the particles of lead arsenate or copper to remain as a film on the foliage. One of the most important factors bearing on the efficiency of a contact wash is the type of water used. Rain water must never be used for spraying plants.

Proposed Legislation

In 1918 a suggestion was put forward by certain manufacturers of insecticides and fungicides that the Government should introduce a bill for "legal control of quality of commercial sprays with common

names." In early 1919 a committee formed by the Chamber of Horticulture made representations to the Ministry of Agriculture, with the result that the Government promised to introduce a bill, but this was deferred in the spring of 1921 owing to need for Government economy. There appeared in the *Journal of the Ministry of Agriculture* (October, 1921) an article dealing with the proposed legislation where it is urged that "Purchasers of insecticides and fungicides are earnestly advised to stipulate before taking delivery that the articles is the most suitable supply for spraying. Where hard waters are used the soap content must be increased to prevent the formation of an insoluble curd. Surface water supplies vary with the geological formation of the surrounding country, whilst shallow and deep well waters are usually hard and should be avoided. Brackish waters supplied should comply with the conditions laid down." The conditions with regard to nicotine are that the term nicotine is properly applied to the chemical in its free or uncombined state. It is urged that purchasers of this material should have a statement from the seller "as to (1) whether the article is free nicotine or nicotine in combination, such as nicotine sulphate, and (2) the percentage of free nicotine in the article or, if the latter contains nicotine in combination, the percentage of free nicotine which will be produced on treatment with an alkali."

Nicotine sulphate, better known among growers as "Black Leaf 40," is a cheaper form of nicotine and is obtained by combining nicotine with sulphuric acid. The nicotine must be released by the addition of a soot which is sufficiently alkaline to produce the desired effect. It is an efficient insecticide when used at the rate of 20 ounces to 100 gallons of water, in which has been dissolved 10-15 pounds of an alkaline soap. It is non-volatile, and great care must be taken in its application to plants—the spraying of fruit, vegetables and saladings with this wash should be rigidly avoided. When caterpillars are forced to eat foliage sprayed with nicotine sulphate, the material acts as a stomach poison, but the usual action on leaf-eating insects is a repellant one. Nicotine oleate is produced by mixing a solution of nicotine with commercial oleic acid, and, when emulsified with a heavy oil, it has proved a valuable wash for the destruction of insect eggs and scale insects on dormant fruit trees. Like nicotine sulphate, it is non-volatile, and should not be used except as a dormant spray on deciduous trees.

"A NEW DEFINITION OF 'INSECT' is threatened in connection with the Destructive Insects and Pests Bill (writes a correspondent), and I observed recently that you referred to this in the column headed 'Westminster Wisdom.' If the wisdom of Westminster is prepared to go the length of including bacteria and other vegetable organisms in the category of 'insects,' it would appear to be high time to reconsider what exactly the word 'wisdom' connotes. But not only is 'insect' to be defined, according to this wonderful bill, as including bacteria, etc.; it is also to include a variety of animal organisms and 'any agent causative of a transmissible crop disease.' Apparently we may yet live to see human beings and appliances used in agriculture classified as insects by Act of Parliament."

CANDY*

ONE OF THE MOST significant features of our changing food habits during the past century has been the increasing use of sugar. The annual per capita consumption has risen from less than nine pounds in 1823 to more than 110 pounds at the present time. In commenting on this statistical fact, Mendel [1] has recently attempted to evaluate it with respect to our dietary needs. Assuming the average daily energy requirement to be 2500 calories, the Americans used, in 1823, the equivalent of forty-four calories a day; in 1924 they used 547 calories. In other words, although sugar represented, a hundred years ago, less than 1.75 per cent. of our total intake of energy-yielding foods, today it constitutes, Mendel pointed out, about one-fifth of the requisite food intake of our population, or 21.6 per cent. This amounts to about twenty cubes a day of the conventional table variety. Of this food Slosson has paradoxically remarked that its only fault is its perfection. It is so pure that man cannot live on it. This is because refined sugar does not retain vitamins, and vitamins are necessary to health.

Over-indulgence in sugar has been assailed on many occasions as a national dietary fault. The food is charged with being susceptible to fermentation and having a disturbing influence on digestion when

*Reprinted in full from the *Jour. Amer. Med. Assoc.*

[1] Mendel, L. B.: Our Changing Food Habits, in Your Weight and How to Control It, edited by Morris Fishbein, New York, George H. Doran Company, 1927.

consumed in liberal amounts. Students of diabetes have warned from time to time that the inordinate use of sugar may predispose to the disease, though it may really be the excess of any food rather than of carbohydrate in particular that is liable to do harm. Because of its high fuel value and ready utilization, sugar tends to displace other foods that are carriers of desirable inorganic salts, vitamins and bulk. Professor Sherman [2] further charges that from a gastronomic standpoint in the American cuisine sugar is used with too many kinds of food, with a consequent loss of variety and piquancy of flavor in the different dishes. The nutty flavor of grains and the natural taste of mild fruits are often concealed by the addition of large quantities of sugar.

Candy is an article of diet, rich in sugar, that has found great favor in this country. Americans have been termed a candy-loving nation, and much of the criticism leveled at the undue use of sugar is directed to the use of candy. To what extent the popular confection may deserve this opprobrium, if any, can now be better determined from a recent survey made by the Department of Commerce of the country's candy consumption in 1926. About 80 per cent. of the candy makers of the nation showed total candy sales of 1,083,399,754 pounds, valued at $258,251,562. This was at a rate of about nine pounds for every man, woman and infant at an average per capita cost of more than $2. If these figures are arbitrarily augmented to represent the assumed entire per capita candy production at eleven pounds with an average food fuel value of 20,000 calories, the candy contribution to the day's allowance amounts to fifty-four calories, or only 2 per cent. of the provisionally accepted daily requirement of 2500 calories. This could scarcely be made the basis of cogent criticism, particularly in view of the fact that much candy is the carrier incidentally of such wholesome foods as nuts and dried fruits. However, consideration of "averages" in such instances may be misleading. Candy is by no means a food universally eaten by all of our millions of population. Consequently the quota that reaches the smaller number of actual users is correspondingly increased. The fact that the sales in one state, Connecticut, were doubled in a single year suggests that where candy is liberally eaten its actual contribution to the day's intake is by no means as negligible as the "average" statistics for the entire population of the United States would lead one to infer.

[2] Sherman, H. C.: Food Products, New York, Macmillan Company, 1924.

IRON IN THE TREATMENT OF ANEMIA*

WHILE chlorosis, a term applied to a condition characterized by a diminished percentage of hemoglobin in the blood occurring in young girls, is becoming increasingly infrequent, in cities at least a lowered hemoglobin is now seen rather often in adults. In fact, in many conditions of impaired health and vitality, without any specific disease, the hemoglobin percentage is found to be between seventy and eighty. Several causes, in cities, for this lowered hemoglobin may be hypothecated, from the inhalation of carbon monoxide in small quantities, more or less constantly, to a lowered percentage of hemoglobin associated with subacute or chronic focal infection. In all serious diseases, secondary anemia occurs sooner or later.

Iron needed for the production of hemoglobin in health is acquired from the iron-containing food and drink. In disease conditions, chemical or glandular disturbances in the body seem to prevent this normal bodily acquirement of iron from nutriments. In most cases of nutritional anemia and secondary anemia, and more or less in primary anemia, the administration of iron is of benefit. The positive benefit in anemias from the administration of liver or liver extracts has recently been demonstrated. Besides the iron contained in liver tissue, the administration of liver represents vitamin medication.

The administration of iron subcutaneously or intravenously is rarely necessary or desirable. Recent studies as to the value of inorganic iron in anemia by Helen S. Mitchell and Margery Vaughn [1] indicated that the hemoglobin determination was more significant than the number of erythrocytes in nutritional anemia. Consequently, the hemoglobin percentage was used as a determination of the benefit derived from various iron salts fed to rats in which nutritional anemia had been caused. They found, as it has clinically long been decided, that small doses of iron are sufficient to cause improvement. Large doses of iron do not increase the hemoglobin improvement but pass off as unutilized salts in the feces.

These investigators repeated experimental work done with iron by Mitchell and Schmidt [2] and found that the conclusions drawn by

*Reprinted from *Journal of the American Medical Association.*

[1] Mitchell, Helen S., and Vaughn, Margery: *J. Biol. Chem.* *75*: 123 (Oct.) 1927.

[2] Mitchell, Helen S., and Schmidt, L.: *J. Biol. Chem.* *70*: 471 (Oct.) 1926.

the previous investigations were correct. In this more recent investigation Mitchell and Vaughn found that the best hemoglobin improvement was caused by administering ferric acetate, ferric albuminate (5 per cent. Fe_2O_3), ferric chloride and ferric citrate. Ferric oxide, ferrous carbonate, ferrous sulphate, ferrous lactate and ferrum reductum (reduced iron) were inferior to the substances listed. The solubility seemed to be an important factor. They found that the ferrous carbonate, of which the much used Blaud pill is composed, is somewhat inferior to the saccharated ferrous carbonate in raising the hemoglobin content of the blood.

CORRESPONDENCE

SCIENTIFIC SECTION

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Second Vice-Chairman, F. J Bacon
Secretary, Paul S. Pittenger
307 W. Pratt Street
Baltimore, Md.
Delegate to House of Delegates,
J. C. Krantz, Jr.

Baltimore, Md., May 18, 1928.

Dear Sir:

The seventy-sixth annual convention of the American Pharmaceutical Association will be held at the Eastland Hotel in Portland, Me., during the week of August 20, 1928.

Your officers are planning to make the sessions of the Scientific Section as instructive and interesting as possible.

In order to do this, however, it is necessary that we have your cooperation and assistance and are, therefore, depending upon you for at least one paper upon any subject coming within the scope of our section.

There is no limit as to the length of papers presented, but in order that all may have an equal opportunity to read their papers, your attention is again called to the fact that the "By-Laws" of the section limit the time allowed for the presentation of each paper to ten minutes, with an additional five minutes for discussion.

The value of our meeting depends as much, and sometimes more, upon the character of the discussions as upon the papers presented. We are, therefore, again asking each author to help us enhance the

value of the discussion by submitting to the secretary a 250-word or less abstract of each paper to be presented.

The secretary will mimeograph these abstracts and distribute them to the section members in order to determine the papers in which they are most interested and can come to the section meetings prepared to intelligently discuss them.

As a reward for promptness in sending in abstracts of papers, arrangements are being made with Science News Service, and various scientific publications, to give publicity to the papers which will be presented before our section.

Only abstracts which are received promptly will be of service for this purpose. We trust, therefore, that we may receive the title and abstract of your paper at the EARLIEST POSSIBLE DATE.

If it is impossible to forward your titles and abstracts in time for advance publicity, please endeavor to have them in the hands of the secretary by July 1st.

Papers received after July 1st cannot be assured of a place on the program and presentation can only be permitted as time may allow.

The program must be completed by this date in order to have it included in THE JOURNAL the month before the meeting.

Trusting that you will co-operate with us in making the sessions of the scientific section A BIG SUCCESS by contributing at least one paper, we remain,

Very truly yours,

L. W. ROWE,
Chairman.

PAUL S. PITTENGER,
Secretary.

PROGRAM OF THE 1928 ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

THE FOLLOWING general program for the seventy-sixth annual meeting of the American Pharmaceutical Association and of the 1928 meeting of the affiliated organizations has been approved by the council and by Local Secretary E. F. Carswell and the General Committee of Arrangements of which Mr. J. H. Dow of Portland is the chairman.

All official sessions of the meeting will be held in the Eastland Hotel, Portland, Me.

SATURDAY, AUGUST 18, 1928

9:30 A. M. National Conference on Pharmaceutical Research.
2:00 P. M. National Conference on Pharmaceutical Research.

MONDAY, AUGUST 20, 1928

9:00 A. M. Meeting of the Council, A. Ph. A.
9:00 A. M. National Association Boards of Pharmacy.
9:00 A. M. American Association of Colleges of Pharmacy, Teachers' Conferences.—Chemistry Section; Practical Pharmacy Section; Materia Medica, Pharmacognosy and Botany Section; Commercial Pharmacy Section.
2:00 P. M. National Association Boards of Pharmacy.
2:00 P. M. American Association of Colleges of Pharmacy.
2:00 P. M. Visit to the Longfellow Home (for the ladies).
6:00 P. M. American Association of Colleges of Pharmacy, Dinner.
8:00 P. M. National Association Boards of Pharmacy.
8:00 P. M. American Association of Colleges of Pharmacy.
9:30 P. M. Informal Dance.

TUESDAY, AUGUST 21, 1928

8:30 A. M. Joint Session National Association Boards of Pharmacy and American Association of Colleges of Pharmacy.
1:30 P. M. First Session House of Delegates, A. Ph. A.
2:00 P. M. Auto Trip to Fort Williams (for the ladies).
2:30 P. M. National Association Boards of Pharmacy.
2:30 P. M. American Association of Colleges of Pharmacy.
6:30 P. M. American Pharmaceutical Association—Banquet, followed by dancing.

WEDNESDAY, AUGUST 22, 1928

9:00 A. M. First General Session, A. Ph. A.
2:00 P. M. House of Delegates, A. Ph. A.
2:00 P. M. Card Party (for the ladies).
4:30 P. M. Conference of Pharmaceutical Association Secretaries.
8:00 P. M. First Session Scientific Section.
First Session Section on Commercial Interests.
First Session Section on Historical Pharmacy.
9:30 P. M. Informal Dance.

THURSDAY, AUGUST 23, 1928

9:00 A. M.	Council, A. Ph. A.
9:00 A. M.	First Session Section on Education and Legislation. First Session Section on Practical Pharmacy and Dispensing. Second Session Section on Historical Pharmacy.
12:00 M.	Luncheon of Veteran Druggists.
2:00 P. M.	General Session, A. Ph. A.
2:30 P. M.	Auto Ride (for the ladies).
4:30 P. M.	Conference of Pharmaceutical Association Secretaries.
8:00 P. M.	Joint Session Scientific Section and the Section on Practical Pharmacy and Dispensing. Second Session Section on Commercial Interests.
8:00 P. M.	Card Party (for the ladies).

FRIDAY, AUGUST 24, 1928

9:00 A. M.	House of Delegates, A. Ph. A.
1:15 P. M.	Organ Recital (Municipal Organ) in the City Hall.
2:30 P. M.	Second Session Scientific Section. Second Session Section on Practical Pharmacy and Dispensing. Second Session Section on Education and Legislation.
7:00 P. M.	Final Session House of Delegates.
9:00 P. M.	Final General Session, A. Ph. A.
10:30 P. M.	Reorganization Meeting of the Council, A. Ph. A.

SATURDAY, AUGUST 25, 1928

10:30 A. M.	Sail among the Islands in Casco Bay, followed by a Grand Shore Dinner.

Additional Information

The Plant Science Seminar will meet at the Massachusetts College of Pharmacy, Boston, Mass., during the week of August 13, 1928.

The Kappa Psi Fraternity will hold its annual meeting in the Eastland Hotel, Portland, Me., during the week of August 13, 1928.

The Phi Delta Chi Fraternity will have a dinner at the Eastland Hotel, Portland, Me., on Wednesday, August 22, 1928, at 6 P. M.

The Second Symposium on the Genus Mentha will be held at the Eastland Hotel, Portland, Me., during the week of August 20, 1928.

E. F. KELLY,
Secretary.

MEDICAL AND PHARMACEUTICAL NOTES

DECLARATION OF INGREDIENTS AND CONTENTS—With certain exceptions, the Food and Drugs Act does not require manufacturers to state the names of ingredients on their labels. The exceptions, where a declaration of ingredients is required, are as to preparations containing alcohol of any kind, morphine, opium, heroin, cocaine, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, acetanilid, or any derivative or preparation of any such substances therein contained. In each one of the exceptions just mentioned, the quantity or proportion of each enumerated ingredient must be stated "in a plain and conspicuous manner."

As to alcohol, the quantity in a drug shall be stated "in terms of the average percentage by volume of absolute alcohol in the finished product."

When specially denatured alcohol is used, the requirements are thus stated in an announcement made by the Department of Agriculture:

> "The Bureau of Internal Revenue has authorized the use of specially denatured alcohol in the manufacture of certain drugs. Some of the denaturants permitted are derivatives of alcohol. For the present the requirements of the Federal Food and Drugs Act relating to the declaration of alcohol and its derivatives will be considered satisfied by either:
>
> "(a) Declaration of the percentages of alcohol and of each of its derivatives present as a denaturant in the finished product, or
>
> "(b) Declaration of the percentages of specially denatured alcohol in the finished product.
>
> "If (b) is chosen, the number of the formula of the denatured alcohol used should be stated. For example, if a product contains 50 per cent of specially denatured alcohol, formula 23-B, the declaration should be 'Contains 50 per cent Specially Denatured Alcohol, Formula 23-B.'"

In stating the quantity of other substances already specified, except alcohol, and the quantity of any derivative or preparation of any such substance, including derivatives of alcohol, the regulations require that these statements be made "in terms of grains or minims

per fluid ounce; in a solid, the quantity shall be stated in terms of grains or minims per avoirdupois ounce, provided that statements may be in terms of the metric system, if preferred."

The regulations also provide that a statement of the maximum quantity or proportion of any of these specified substances present in any preparation will meet requirements, "provided the maximum stated does not vary materially from the average quantity or proportion."

In the manufacture and sale of preparations which do not contain any of the substances that have been specified, the manufacturer need not make a declaration of the ingredients he has employed. If, however, such a declaration is made, the list of essential ingredients must be accurate and complete, so that the purchaser may receive a correct impression of what the particular preparation contains. In other words, if one essential ingredient is mentioned, all such ingredients must be listed. But the manufacturer need not include in his declaration any non-essential ingredients, such as are used for coloring or flavor or for binding purposes, since those ingredients have no therapeutic effect and their declaration might be in the nature of a disclosure of trade secrets, which the law does not require.

What has just been said regarding ingredients also is true of statements as to weight, measure or count on a package containing drugs or medicine. The Food and Drugs Act does not require statements as to weight, measure or count on the container of a medicinal preparation, but if such statements are made they should be accurate and complete.—*Bull. U. M. M. A.*

Poison Ivy Terrors Banished by Chemicals—Poison ivy, the bane of the tourist's and picnicker's existence, has lost its terror before the onset of modern science. A cure that works in practically 100 per cent. of all cases has been found in a common, cheap, non-proprietary chemical by a research worker of the U. S. Department of Agriculture, Dr. James F. Couch. The compound is potassium permanganate, and is applied by swabbing a 5 per cent. solution on the afflicted parts of the skin with a soft cloth or bit of cotton. In a short time the itching and burning stop, and recovery is rapid. The treatment leaves a brown stain on the skin, which can be removed, if desired, by washing in a 1 per cent. solution of oxalic acid. The latter being poisonous, it should be kept out of the reach of children.

A preventive treatment, which will enable susceptible persons to handle poison ivy with impunity, has been worked out by Dr. James B. McNair, of the Field Museum of Natural History at Chicago. This consists of a 5 per cent. solution of ferric chloride, another common, non-proprietary chemical, in a half-and-half mixture of water and glycerin. This is washed freely on the skin, and permitted to dry there, before going into the ivy-infested region. The compound contains iron, which enters into chemical combination with the ivy poison and renders it harmless. Repeated tests of this preventive treatment on persons who had always been easily poisoned have shown it to be highly effective.

Poison ivy, in spite of its name and its ivy-like appearance, is really a member of the sumac family. A related plant, poison sumac, looks more like the common sumacs, but unlike them is even more poisonous than the ivy. It grows only in bogs, so that it is less frequently encountered by summer hikers.

Poison ivy is a strictly American plant, and its history dates back to the days of the Jamestown settlement. Captain John Smith wrote of it: "The poisonous weed, being in shape but little different from our English yvie; but being touched causeth reddness, itchinge, and lastly blysters, the which howsoever after a while they passe awaye of themselves without further harme; yet because for the time they are somewhat painefull, and in aspect dangerous, it hath gotten itself an ill name, although questionlesse of noe very ill nature."

This is the first known clinical note on poison ivy, and despite Captain John Smith's reputation as a forerunner of Baron von Muenchausen, it is as accurate a description of a case of ivy poisoning as a modern physician could write.—*Science Service.*

Oil Content of Seed Quickly Known by New Method—Determining the oil content of seed and other farm products in approximately fifteen minutes at a cost of less than one cent per test is made possible by the use of the so-called Wesson method developed by the United States Department of Agriculture for the rapid estimation of linseed oil content of flaxseed and linseed meal.

Further researches by the department to extend the technic of the test to other oil-bearing materials have demonstrated the practicability of the method applied to sixteen additional products, including peanuts, soy beans, cacao beans, cacao shells, cocoa, and sweet chocolate.

The procedure necessary in the application of the method to each commodity is described in Technical Bulletin 71-T, entitled "A Simple Method for Determining the Oil Content of Seeds and Other Oil-Bearing Materials," copies of which may be obtained from the Department of Agriculture, Washington, D. C.

GLYCERIN FROM WHALE OIL—With whales being killed at the rate of 18,000 per year, some system of licensing through an international agreement should be established to prevent the great cetaceans from becoming extinct and to safeguard the future of the industry, Lewis Radcliffe of the U. S. Bureau of Fisheries told members of the American Society of Mammalogists at their recent meeting. Though the whaling industry today is largely in the hands of the Norwegians, an increasing flood of the articles made from whale oil, of which over 60,000,000 gallons were produced last year, is finding its way into the American markets, Mr. Radcliffe declared. Soap factories are the largest consumers of whale oil but glycerin derived from whale oil is used as the basis of many kinds of beauty creams, shaving soaps, tooth paste and other toilet preparations. In Europe some of the oil is made into lard substitutes and candles. Sperm oil is a valuable lubricant while spermaceti is used in cold cream. Whale meal, bone meal, blood meal, stearine and canned whale meat are other by-products of this old-new industry that have swelled its income to around $30,000,000 annually.

Whaling ceased to be predominatingly American, said Mr. Radcliffe, at the time of the Civil War when the New England whalers were burned, captured or turned into warships. The discovery of petroleum as an illuminating agent gave it another setback in this country. The invention of the harpoon gun in 1864, however, marked a new era in whaling. This and the use of steam whalers and motor launches that permit the towing of the captured animal ashore to stations where the carcass can be more completely utilized have revolutionized the industry. An even more efficient phase was the development of the floating factory whereby the whole outfit of small whalers and manufacturing plant could transfer itself to new fields as fast as one was exhausted.

Since the beginning of the twentieth century whaling operations have been confined largely to the Antarctic where they still remain largely in the control of Norwegian companies.

POLLEN AND HAY FEVER—The spring hay fever season is officially started. Maple and elm trees, oaks, hickories, and walnuts have announced the open season for sneezing by broadcasting their pollen on the April air. And in return the first faint hay fever sneezes have promptly been set off.

Spring hay fever, caused by the pollen from trees, is less likely to be recognized than the summer hay fever due to weeds and grasses, according to Dr. Harry S. Bernton, associate professor of preventive medicine, Georgetown University Medical School. Many people who start sneezing about this time of year attribute their symptoms to colds due to the fickle changes of spring weather.

Hope for some of the baffling cases of hay fever due to grass pollen is held out this year by Dr. Bernton, through new analyses of the pollen grains. It has been customary to find out the kind of pollen that irritates the nasal tissues of each hay fever victim, and then to treat the patient with injections of that particular pollen extract until he becomes immune. Recently, by analyzing the pollen, it has been found that a person may be sensitive to one substance in a grain of pollen and not to the rest of the material packed in the tiny grain. Some cases that have stubbornly resisted treatment are due entirely to a sensitiveenss to the albumen fraction in the pollen, Dr. Bernton has found. Albumen makes up only about one-ninth of the extractable protein in the pollen grain. So when these patients were treated with pollen extract they did not get big enough doses of albumen to help them. This year, Dr. Bernton is reinforcing the extract of albumen to see if these puzzling patients can be rendered sneeze-proof.

Foresighted sufferers from summer hay fever are now having the usual pollen injections to render their noses invulnerable by the time the summer pollens get on the air. The newer method of having injections twice a month throughout the year, instead of taking a steady series of treatments before each hay fever season, is slowly gaining favor, Dr. Bernton said. This method seems to produce a more permanent immunity to the disease, but the average hay fever sufferer likes to forget his sensitive nose entirely in the months when he can breathe freely.—*Science Service.*

AUTOMOBILES AND AIR POLLUTION—Surgeon General H. S. Cumming of the U. S. Public Health Service, has recently announced the results of a survey undertaken to ascertain whether or not a

health hazard from carbon monoxide existed in the streets of our large cities, inside of auto busses and in repair shops. Fourteen of the largest cities in the country were visited, having a combined population of over 19,000,000, and 250 samples of air were obtained for carbon monoxide analysis. These samples were analyzed by the iodine pentoxide method, using a liquid air cooling tube which was shown to be necessary in order to eliminate gasoline vapor, a substance which tends to vitiate the results of the analysis. The street samples were taken in such a manner as to approach the most congested conditions that may exist at a busy traffic intersection. Hence it is felt that these results indicate the maximum hazard that may exist today in the metropolitan thoroughfares from automobile exhaust gas. The average of 141 tests made in city streets at peak hours of traffic showed a contamination of 0.8 part of carbon monoxide per 10,000 parts of air. Only 24 per cent. of all the street samples had more than one part of carbon monoxide in 10,000 of air and in only one location, a covered passageway, were there as much as two parts per 10,000. Samples taken inside of auto busses yielded even lower concentrations of carbon monoxide gas. The figures for street air, when viewed in the light of present-day standards of exposure to carbon monoxide, do not reveal the existence of a health hazard from this source in our city streets. The only individual who may possibly be exposed to a health hazard from inhaling street air containing automobile exhaust gas is the traffic officer. This potential hazard may be minimized by diminishing the duration of exposure at the most congested traffic stations.

On the other hand, of the 102 tests made in 27 garages in the 14 cities visited, the average carbon monoxide content was found to be 2.1 parts in 10,000. More than half of the samples (59%) contained over 1 part of carbon monoxide and 18 per cent. of all the samples contained over 4 parts of this gas in 10,000 parts of air. These results for repair shops show a dangerous condition that demands the serious consideration of those concerned. This hazard in repair shops may be reduced to a minimum by not allowing the motors of automobiles to run longer than thirty seconds unless the car is in necessary motion or the exhaust is connected to the outside air by a direct, air-tight outlet of ample caliber. Without such outlet no automobile engine should be allowed to run indoors, except to reach its berth or to leave, by the shortest route. All of these samples were taken in garages of considerable size. The great dan-

ger to life is unquestionably in the small private garage containing one or two cars. Under any circumstances the discharge of an automobile exhaust into a roofed enclosure should be regarded as a hazardous act.—*U. S. P. H. S. Bulletin.*

CATALOGUE OF INSECTS OF IMPORTANCE IN PUBLIC HEALTH—The United States Public Health Service has just issued Bulletin 150, Hygienic Laboratory, entitled "Key-Catalogue of Insects of Importance in Public Health." This represents the fourth catalogue in this series of key-catalogues on medical zoology issued by the Service.

Ordinarily, insects in their relation to health and disease are viewed chiefly from the standpoint of being either external parasites, such as lice and fleas, or transmitters of disease, such as mosquitoes in the case of malaria and fleas in the case of bubonic plague. The present publication carries the subject much more into detail. In the body of the bulletin numerous insects are arranged systematically according to their more or less generally adopted classification with notation as to their public health importance and their geographic distribution. In the introduction, the different genera of insects are cross-referenced to the following subjects:

A, biting insects; B, on cadavers or in graves; C, control of public health pests; D, dermatology (lesions, dermatitis, eruptions, exanthema, parasites, urticaria); E, edible (food, drink); F, excreta; G, food and drink; H, jurisprudence; I, laity (fear, superstition); J, parasites and pseudoparasites (abdomen, ear, external, eye, head, intestine, miscellaneous, mouth, nose, stomach, subcutaneous, throat, urinary system); K, pests (books, clothes, drugs, records, miscellaneous); L, pinching insects; M, poisons (arrows, defensive, food, spines, miscellaneous); N, pollution (air, water); O, stinging insects; P, therapeutics (lay, professional); Q, vectors (Aspergillus, bacteria, filth, Protozoa, Trematoda, Cestoda, Nematoda, Acanthocephala, Insecta).

The publication is of special interest to public health officers, physicians, zoologists, lawyers and students of medicine and zoology, and forms a condensed summary of the entire field of public health entomology.

For instance, if a public health officer wishes to know what particular insects are known or suspected of transmitting a given in-

fectious disease, he refers to the name of this disease in the introduction and then follows the subject as cross-referenced to the body of the work. If a dermatologist wishes to locate the various caterpillars which cause the condition known as Urticaria, he looks up the word "urticaria" in the introduction under Dermatology, and finds cross-references to forty different genera of moths and butterflies, the larval stages of which cause urticaria in man. If a lawyer desires to find a list of the insects of importance in zoological jurisprudence, as for instance, in connection with the Law of Nuisances, or in connection with the French theory of determining how long a human body has been dead, he looks for the word "jurisprudence" in the introduction and finds the subject cross-referenced to the body of the work. In connection with the application of entomology to legal cases involving possible homicide, the authors of this bulletin take a very conservative position towards the French theory, in fact they state that it is of very limited if any practical application.

The work has been prepared by Prof. C. W. Stiles, of the U. S. Public Health Service, and Dr. Albert Hassall of the U. S. Bureau of Animal Industry, on basis of their personal observations combined with thousands of references to the literature indexed in the Government card catalogue.—*U. S. P. H. S. Bulletin.*

NEWS ITEMS AND PERSONAL NOTES

PARKE, DAVIS & COMPANY TO ERECT NEW MANUFACTURING BUILDING—A new building, more than 600 feet long and six stories high, will be added to the Detroit laboratories of Parke, Davis & Company, according to an announcement recently made public.

This structure, which will be devoted to manufacturing, will embody the latest improvements in factory construction and design. It will be of reinforced concrete throughout, with every provision made for the health and convenience of the employees. The exterior of the building will be faced with brick to correspond to that of the Administration Building which was completed last year.

The new building will be constructed in three units and it is expected that the first unit will be ready for occupancy on January 1, 1929.

SEEING SNAKES—The modern way—in the moving pictures. A new film, "The Story of Antivenin" deals with the snake bite problem. The distribution of the species of poisonous snakes, their capture, and the slow motion views of them in act of striking, are shown.

The methods of extracting the venom and the preparation of an anti-snake bite serum are a very interesting part of the picture. Dates for the showing of this picture may be reserved. Secretaries of associations and clubs should communicate with the Antivenin Institute of America, Division of the Mulford Biological Laboratories, Box 1404, Philadelphia.

GERMAN APOTHECARIES VISIT PHILADELPHIA—After having been feted in New York City by various pharmaceutical organizations, a party of German pharmacists numbering twenty-three, arrived in Philadelphia May 17th and were entertained during their brief stay by the Philadelphia College of Pharmacy & Science, the H. K. Mulford Company and the Philadelphia Association of Retail Druggists. Their impressions of the new College were most favorable. They made a thorough tour of the entire building and spoke highly of its educational facilities and equipment. A trip through the Mulford Laboratories at Glenolden and a dinner at the P. A. R. D. home, where the group was joined by a number of guests from New York, were other events that featured their strenuous stay in Philadelphia.

The members of the party included the following: Richard Bretschneider, Annaberg; Fritz Dontschke; Ernst Eckert, Nuernberg; Max Friedlaender, Spandau; Ernst Grube, Naumburg, a.S.; Felix Gruschwitz, Darmstadt; Johann Hassler, Berlin; Mrs. (Dr.) Eva Jablonski, Breslau; Franz Laws, Berlin-Weissensee; Mrs. M. Lichtenstein, Breslau; Dr. Hans Meyer, Berlin; Otto Paul; Udo Puteanus, Wattenscheid; Gerhard Rehbock, Papenburg-Ems; Alfred Rieder, Kenzingen, Baden; Ferd H. Roehrig; Julius Siegmann, Spandau; Otto Stiebeiner; Richard Szamatolski, Frankfort a.M.; Otto Trapp; Dr. Wilhelm Wartenberg (leader of the party), Berlin; W. Kremser and Paul Werner.

Hugo Kantrowitz, editor and publisher of the *Apotheker-Zeitung,* was active in arranging for the entertainment of the visitors and accompanied them on their Western tour.

BOOK REVIEWS

EL INDISPENSIBLE AL FARMACEUTICO, by D. Blas Y Manada, 3d Edition, 163 pages. Published by Imprenta de Ex Estanislao Maestre, Pozas, 12, Madrid. Price: pesetas 15 encuadernado.

Written in Spanish, and obviously more valuable natively than elsewhere, this interesting little work has enough reliable information between its covers to render it worthwhile "in any language."

An indigenous pharmaceutic calendar, comprehensive tables of adult and infant doses, veterinary posology, incompatibilities, solubilities, decompositions, poisons and antidotes, alcoholometry, synonyms for new remedies and various odds and ends of pharmaceutical information comprise the unusual contents of this splendid little volume.

Its emaciated index may not be a handicap to those well versed in Spanish—but to an alien reviewer or reader it seems entirely too insufficient.

IVOR GRIFFITH.

CHEMICAL ENCYCLOPAEDIA. By C. T. Kingzett, Surrey, England. Published by D. Van Nostrand Company, Inc., 8 Warren St., New York City. 1928. Fourth Edition. pp. 807. Price, $10.

"An epitomized digest of Chemistry and its Industrial Applications" so reads an explanatory note with regard to the contents of this book. An American effort in a similar direction produced the Condensed Chemical Dictionary, which though vastly more limited in the number of items "digested' yet is more for informative per item than the book under review.

In the British book we search for chitin and keratin and we find some information regarding them. But they are not mentioned in the American work.

The English book discusses chloranil with no mention of its constants and properties yet the American book supplies these and more.

But again "comparisons are odious," and we designed this for a review of one book, not two.

The title of the book was originally "The Popular Chemical Dictionary," later changed to its present form so as to dispel a sug-

gestion of inaccuracy and empiricism which the original title implied and which this book certainly does not exhibit. The subject-matter of the volume comprises pure physical and applied chemistry, descriptions of the elements and their chief compounds (organic and inorganic) and their methods of preparation, characters and uses. Additionally there are brief accounts of ores and other natural products—of alloys and similar compounds—and of the more important chemical terms and theories. There is in this edition a very useful bibliography for those who seek additional data on certain subjects. The indexing and cross-indexing within the work are admirably done and from the standpoint of comprehensiveness of items there is ample justification for the claim that there is no other work in existence that gives such an extensive range of condensed, up-to-date information concerning chemistry and the chemical industries.

Printing and binding are expertly done. This book should find a very useful place in the working libraries of practical chemists and others interested in the handling of chemicals.

IVOR GRIFFITH.

COMPEND OF PHARMACY. By Francis G. Stewart, Ph. M., M. D. (10th edition). Revised and enlarged by Heber W. Youngken, Ph. G., Ph. D. Pp. 200. Price $2. (P. Blakiston's Son and Company, 1012 Walnut Street, Philadelphia.)

That this little work has reached its tenth edition is tribute to its usefulness. Originally issued in 1886 it has served continuously, through several revisions, as a dependable medium to assist the student in memorizing pharmaceutical information.

Quiz compends have been severely criticized in many quarters as being detrimental to the process of healthy study. When they are used to the exclusion of the more complete works—when they are used solely as "cramming" instruments, the criticism is quite in order. Yet as review books—or as condensed aids in reconsidering the subject—providing they are up-to-date and accurate—they have their decided place.

The present edition of this compend shows much extension over previous editions on the matter of posology—and in the useful tables of incompatibilities, antidotes, etc., furnished at the end of the book.

The printing and binding are of customary Blakiston excellence.

IVOR GRIFFITH.

BULLETIN OF THE LLOYD LIBRARY. The Lloyd Library and Its Makers. An historical sketch by Caswell A. Mayo, Ph. M., Phar. D.

The late Caswell A. Mayo, so we are informed by Professor John Uri Lloyd, took much pleasure in preparing this history of an unusual achievement and it proved to be a farewell gift to his beloved profession, since he was called to rest long before his manuscript found form in print.

The Bulletin shows his fine handiwork and reflects credit upon him—as it does on the Lloyd brothers, whose accomplishment in creating, building up and sustaining this Library, is recorded through its medium.

From very modest beginnings the Lloyd Library grew, slowly but certainly, into the unusual repository of medical and pharmaceutical literature, which it is today. There is no such library elsewhere in the land.

The Bulletin interestingly deals with the makers of the Library—its beginnings—its personnel, past and present—publications of the Library—contents of the Library. There are fine reproductions of old wood-cuts from ancient books and manuscripts and descriptions of and excerpts from early American books on plant medicine "of which the Lloyd Library has perhaps the most complete collection in existence."

As an historical sketch this bulletin is accurate, informative and interestingly written. Pharmacists should read it and learn through it how effectively and wisely the makers of this Library labored so that, endowed as it now is, it will contribute even as time goes on to the education of their fellowmen.

IVOR GRIFFITH.